

Jet Shapes using MidPoint (II)

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QCD Meeting 19th March 2004

Outlook

- Event Selection
- Jet Shapes (Raw)
- Corrections to Hadron Level
- Systematics
- Final Results

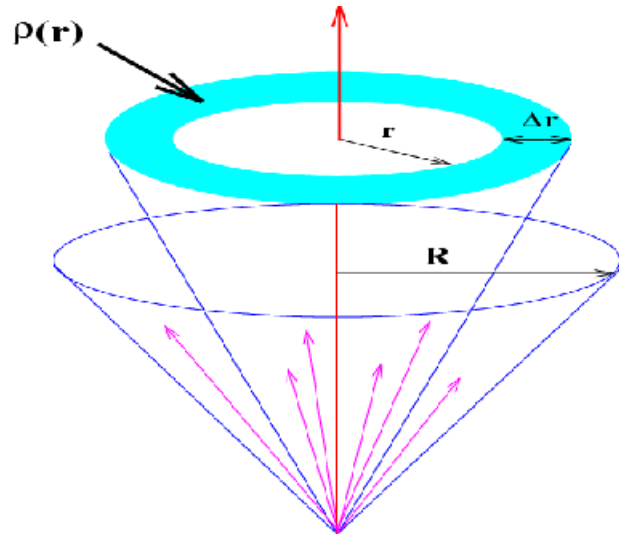
Event Selection

- Using MidPoint Algorithm ($R=0.7$) (merging at 75%)
- Using all Jet Data before Shutdown ($\sim 200 \text{ pb}^{-1}$)
 - J5 (for $p_t > 30 \text{ GeV}$)
 - J20 (for $P_t > 45 \text{ GeV}$)
 - J50 (for $P_t > 70 \text{ GeV}$)
 - J70 (for $P_t > 95 \text{ GeV}$)
 - J100 (for $P_t > 130 \text{ GeV}$)

} Based on Monica's Studies
- Selection Cuts
 - At least one central jet ($0.1 < |Y| < 0.7$) with $P_t > 30 \text{ GeV}$
 - $\text{MET_significance} < 3.5 \text{ GeV}^{-1/2}$
 - $|V_z| < 60 \text{ cm}$
 - $N(\text{vxt}) = 1$
- Comparison DATA (5.3.1pre4) with MC Pythia/ Herwig (4.9.1)

Jet Shapes using COT (Ia)

Jet Shapes using COT (uncorr.)



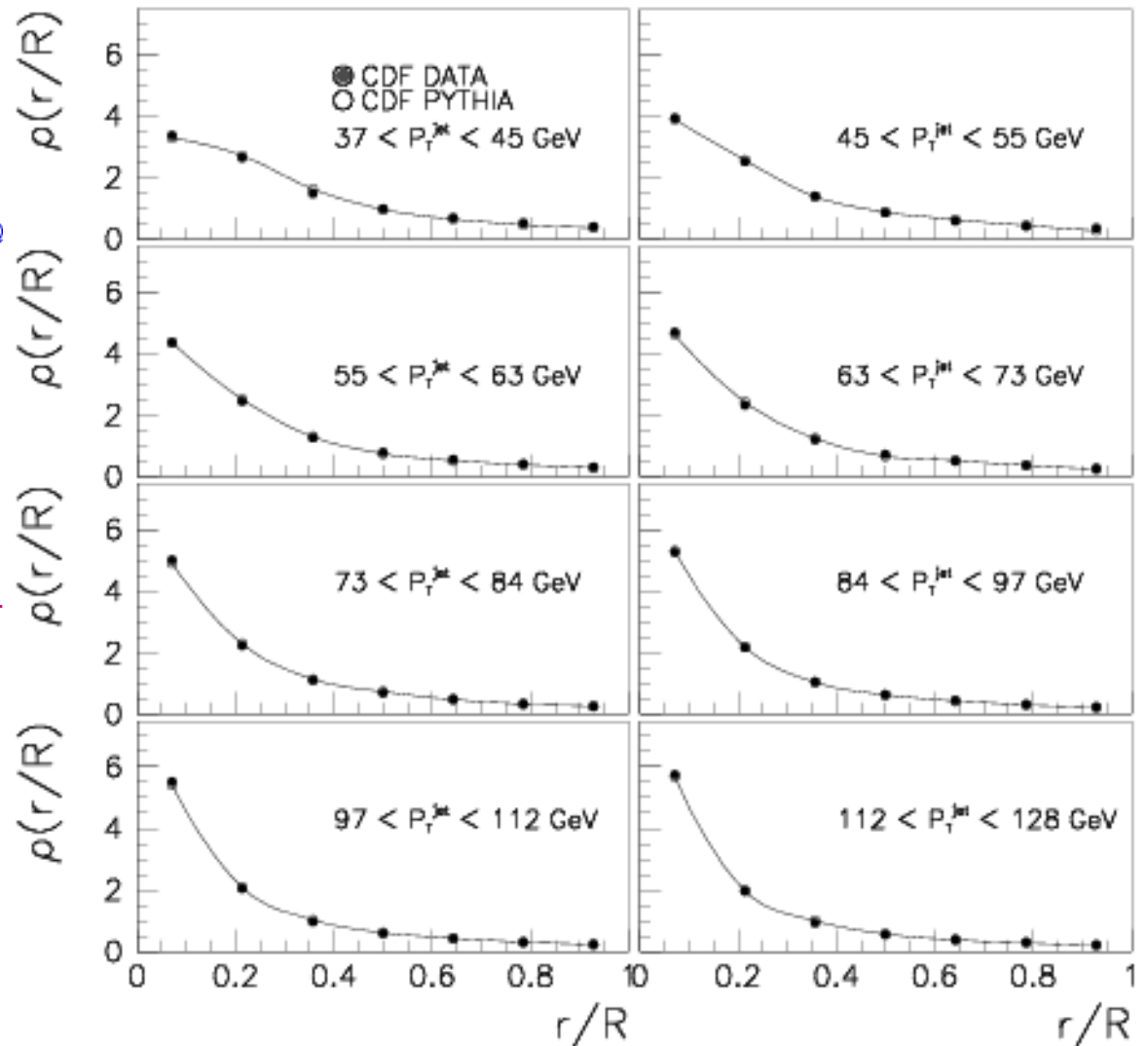
$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0, R)}$$

$$0.5 \text{ GeV} < P_T^{track} < 100 \text{ GeV}$$

$$|\eta^{track}| < 1.5$$

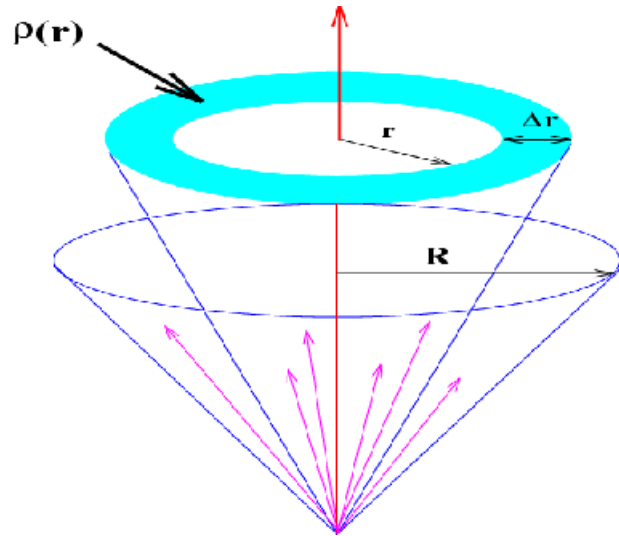
$$|z^{track} - V_z| < 2 \text{ cm}$$

$$\Delta R(\text{track} - \text{jet}) < 0.7$$

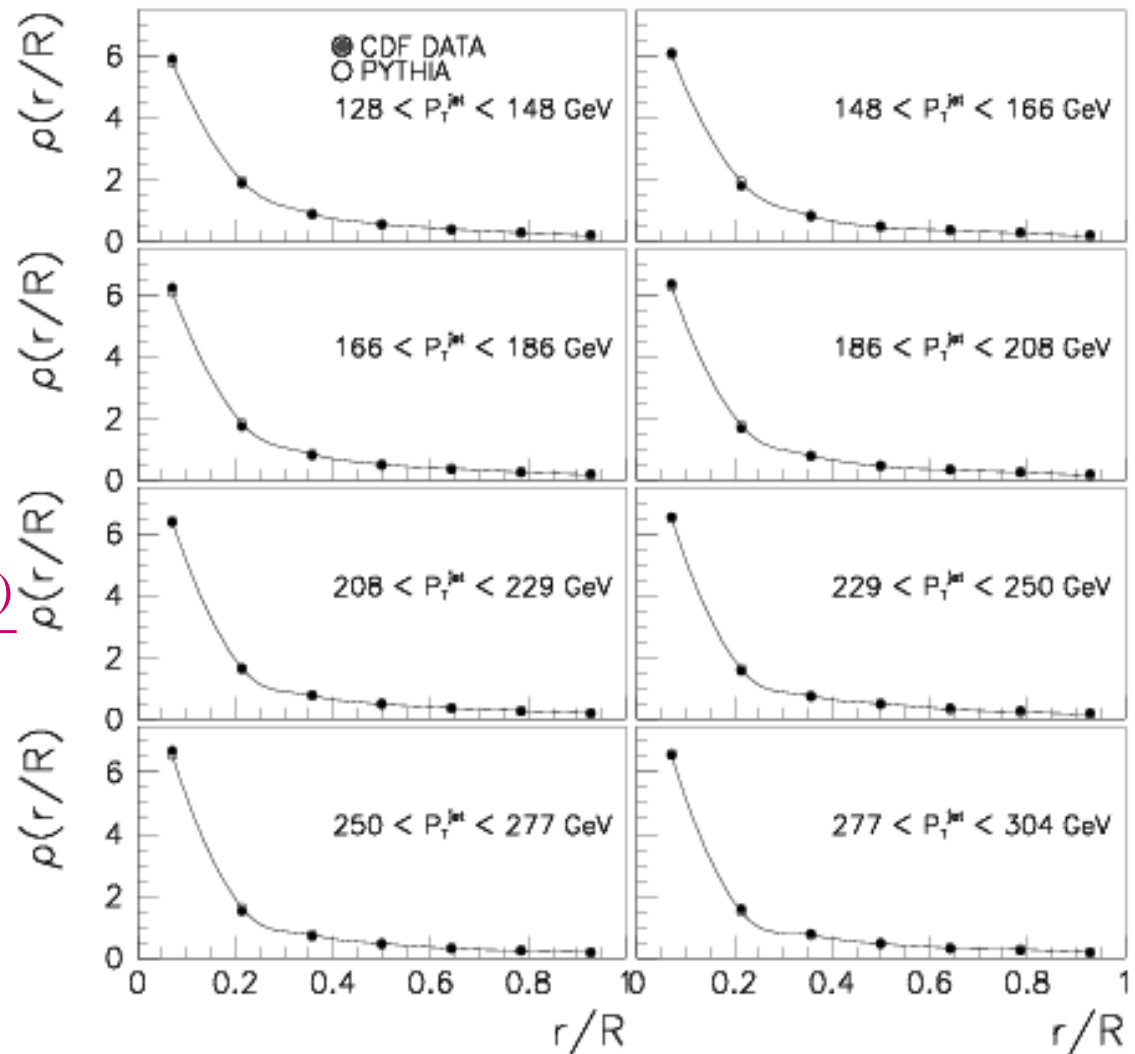


Jet Shapes using COT (Ib)

Jet Shapes using COT (uncorr.)

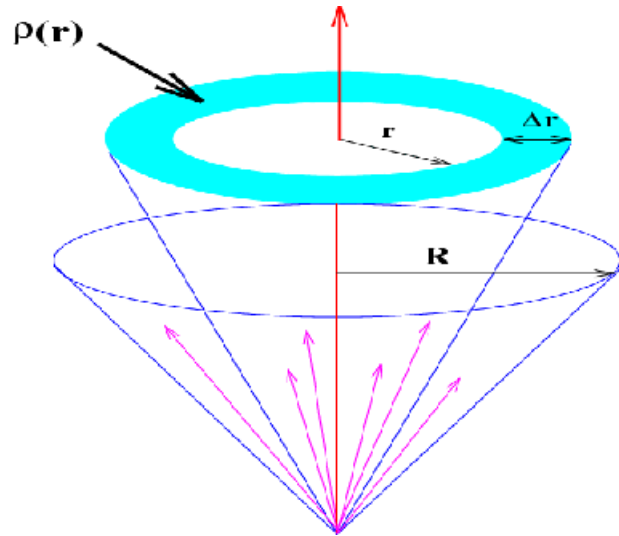


$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0, R)}$$

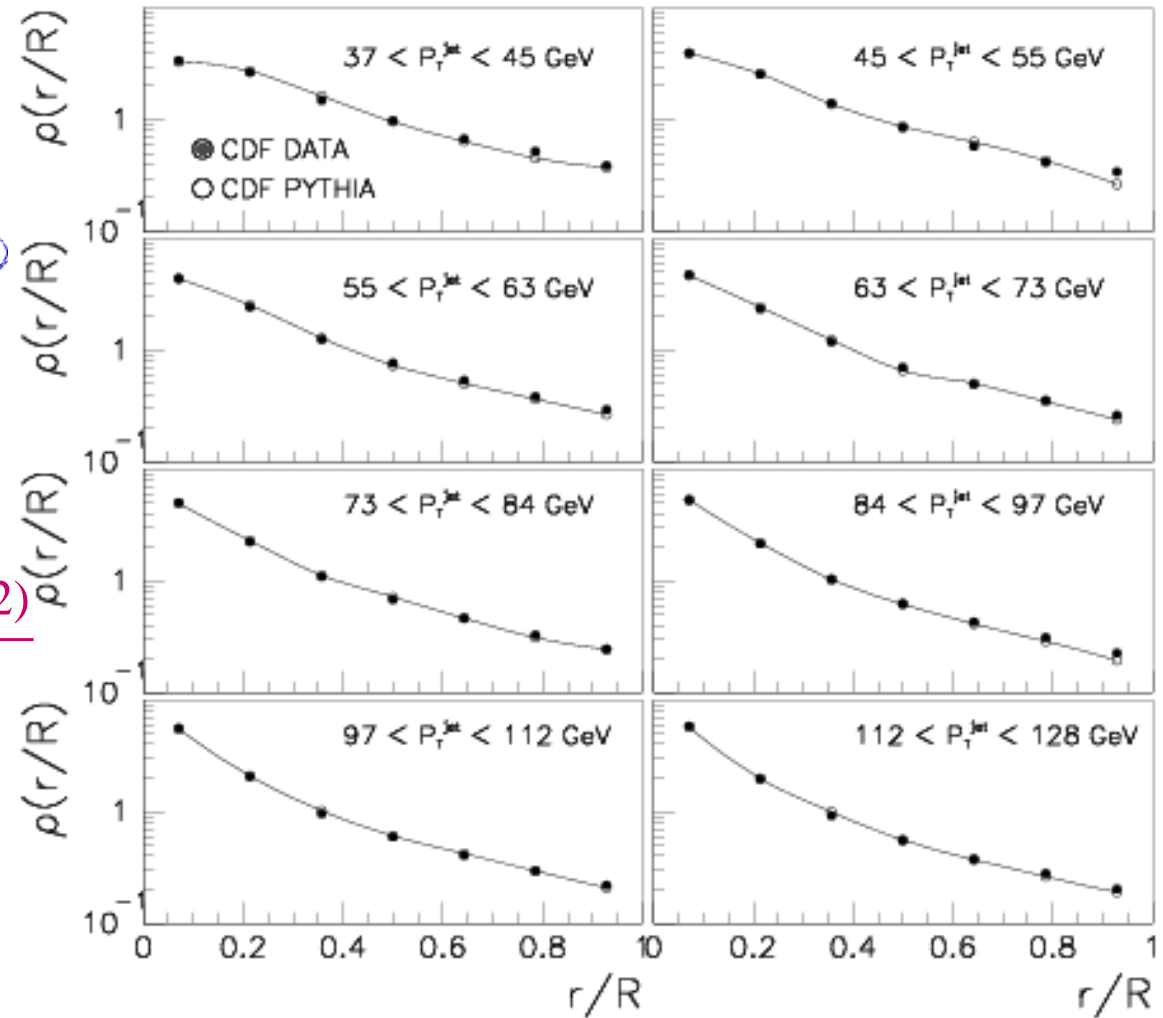


Jet Shapes using COT (Ic)

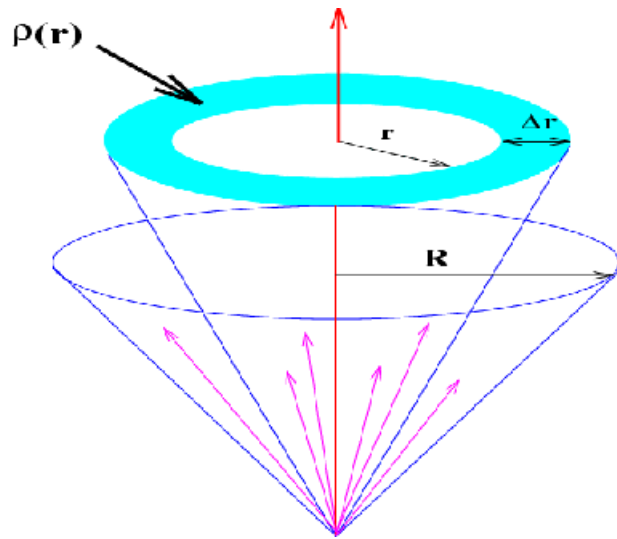
Jet Shapes using COT (uncorr.)



$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0, R)}$$

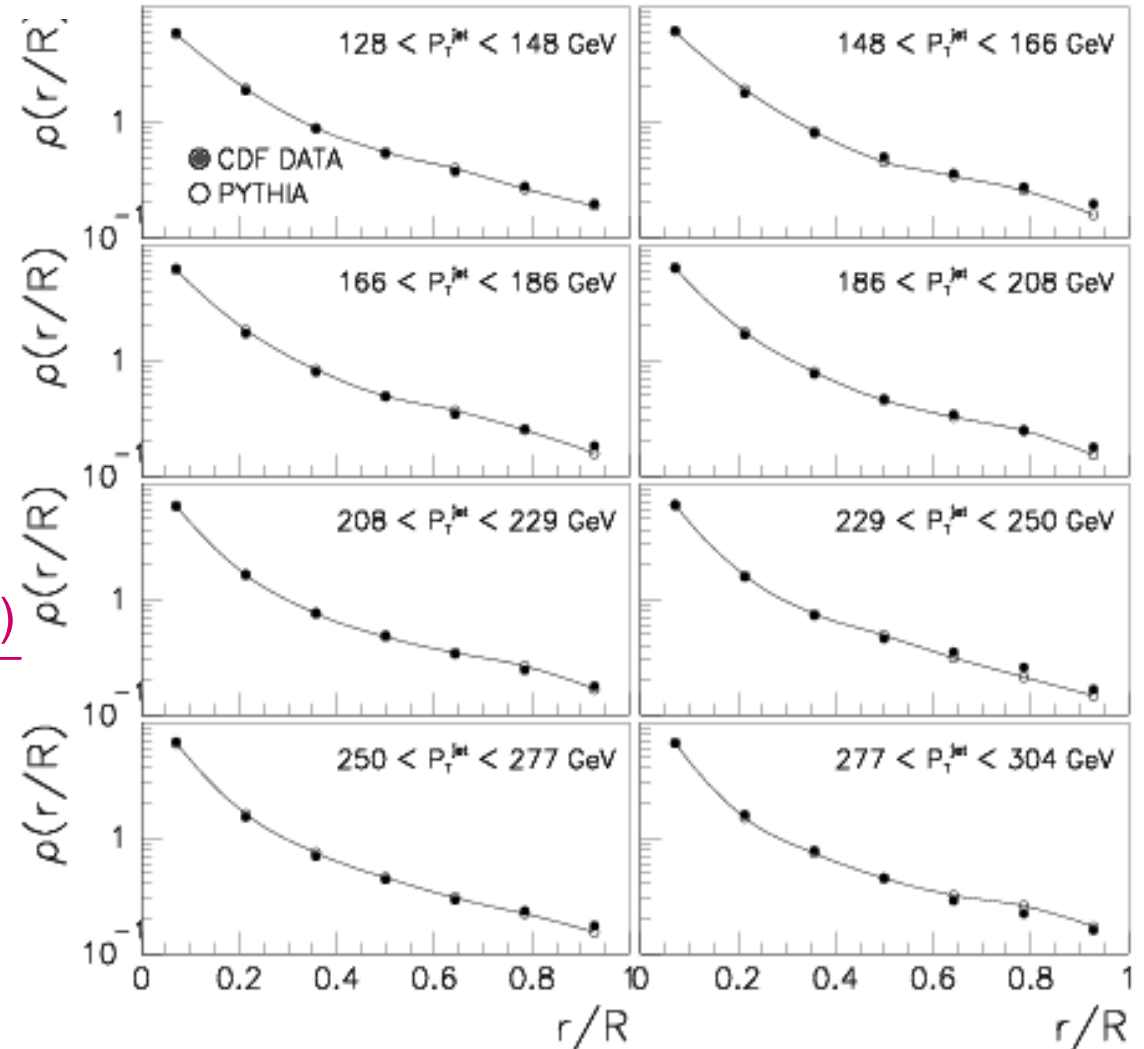


Jet Shapes using COT (Id)

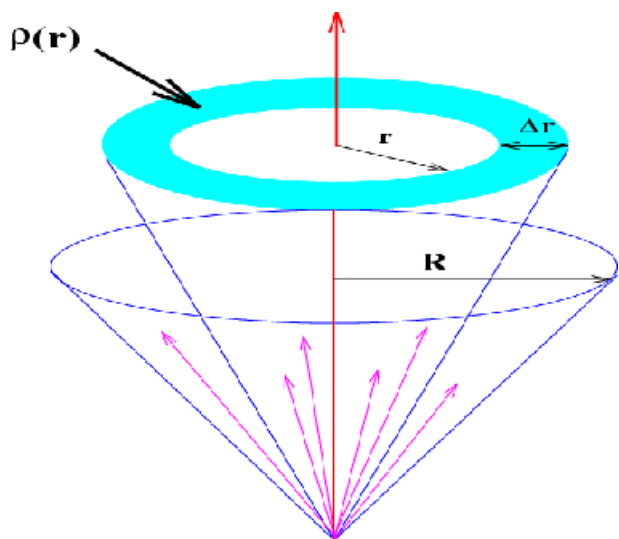


$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{\text{jet}}} \frac{\sum P_T^{\text{tracks}}(r \pm \Delta r / 2)}{\sum P_T^{\text{tracks}}(0, R)}$$

Jet Shapes using COT (uncorr.)

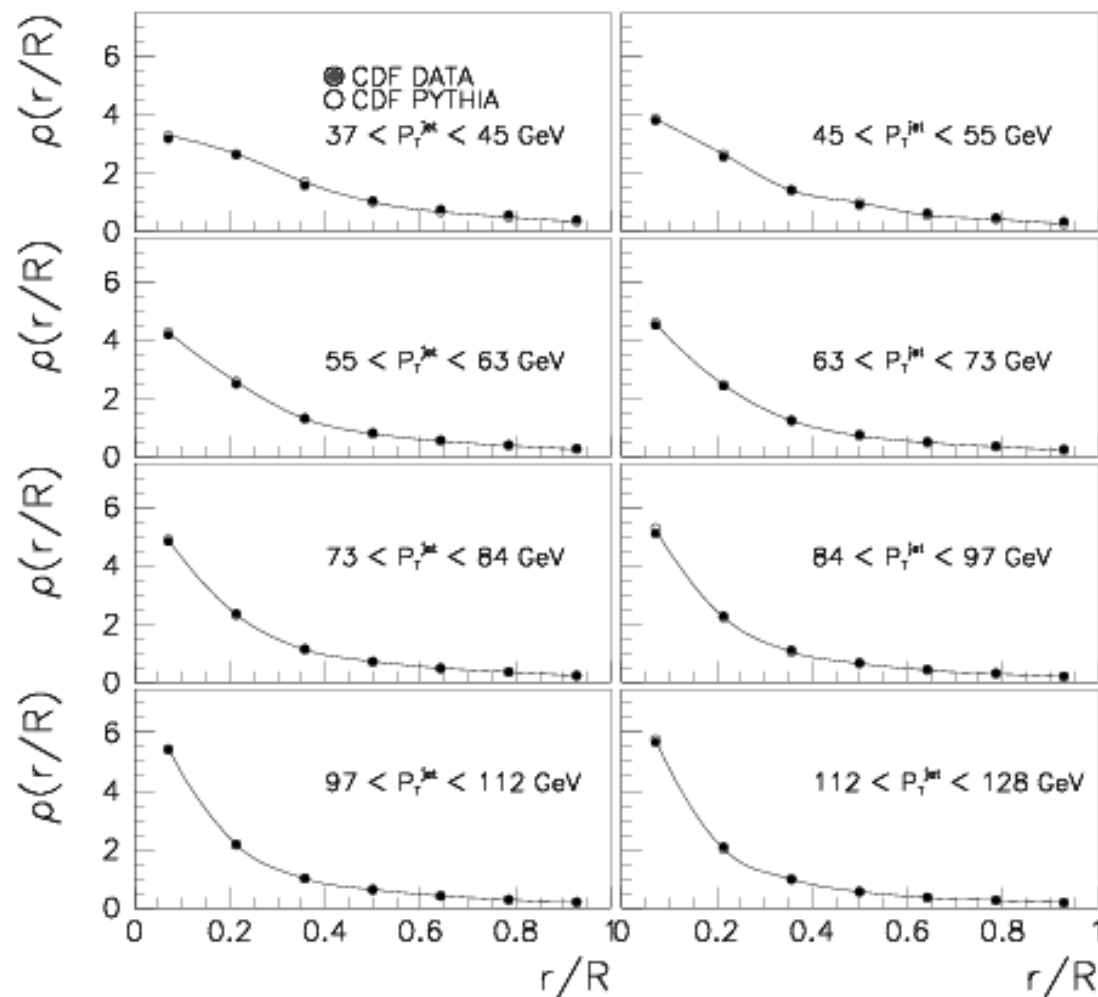


Jet Shapes using CAL (Ia)

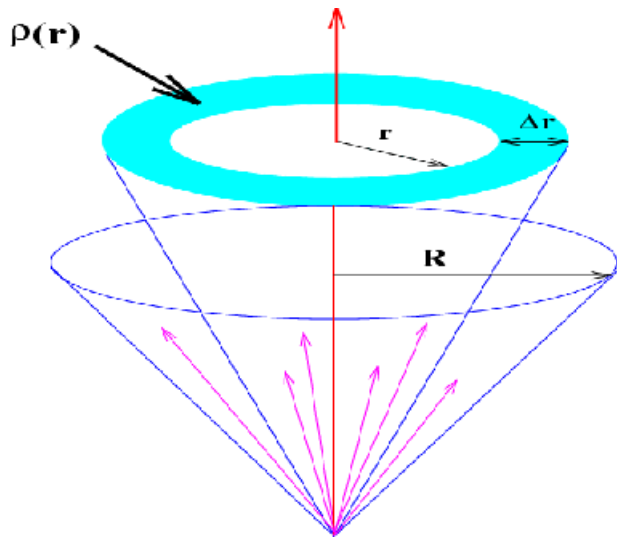


$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0, R)}$$

Jet Shapes using CAL (uncorr.)

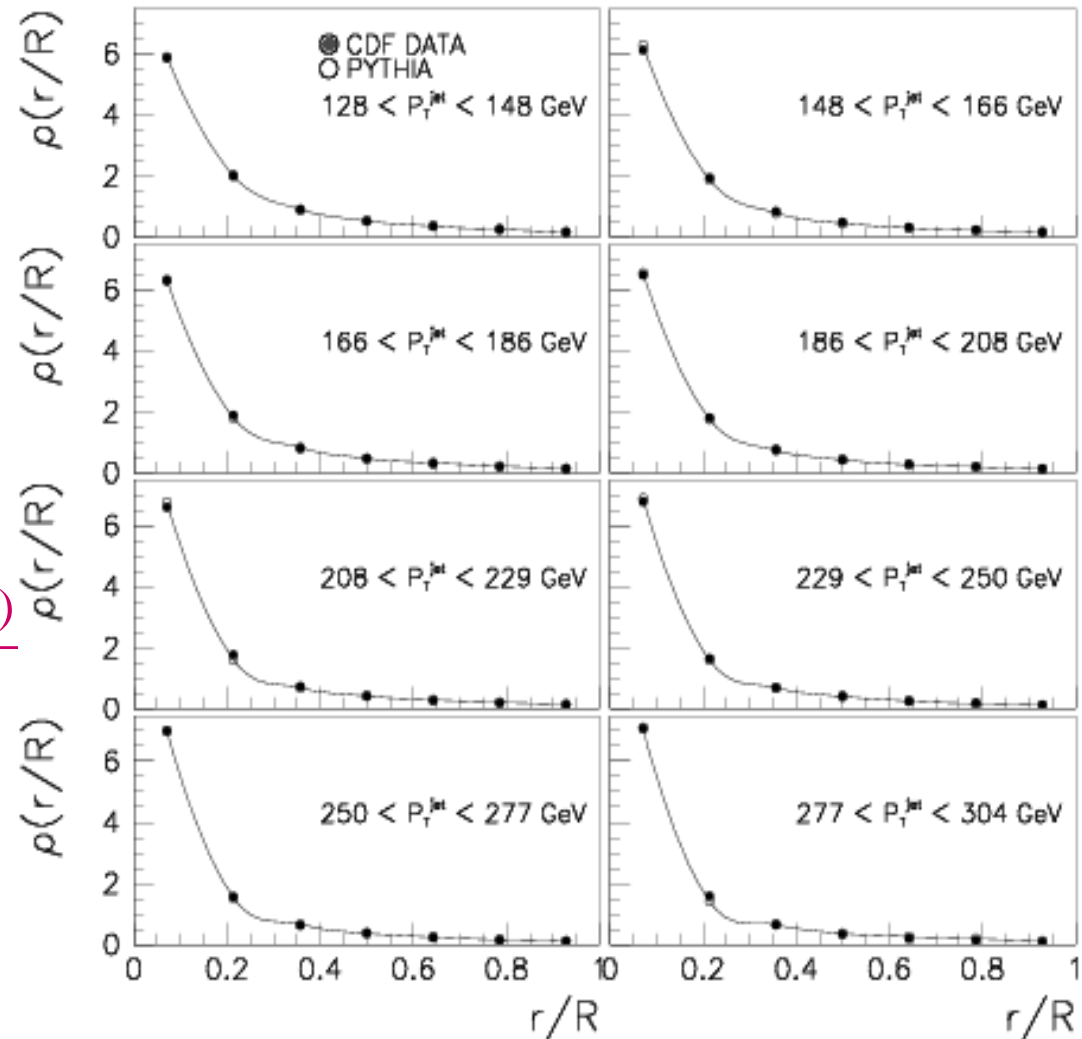


Jet Shapes using CAL (Ib)

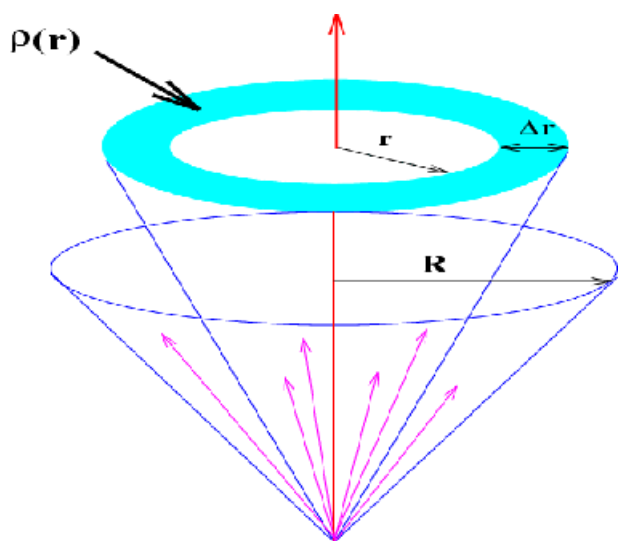


$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0, R)}$$

Jet Shapes using CAL (uncorr.)

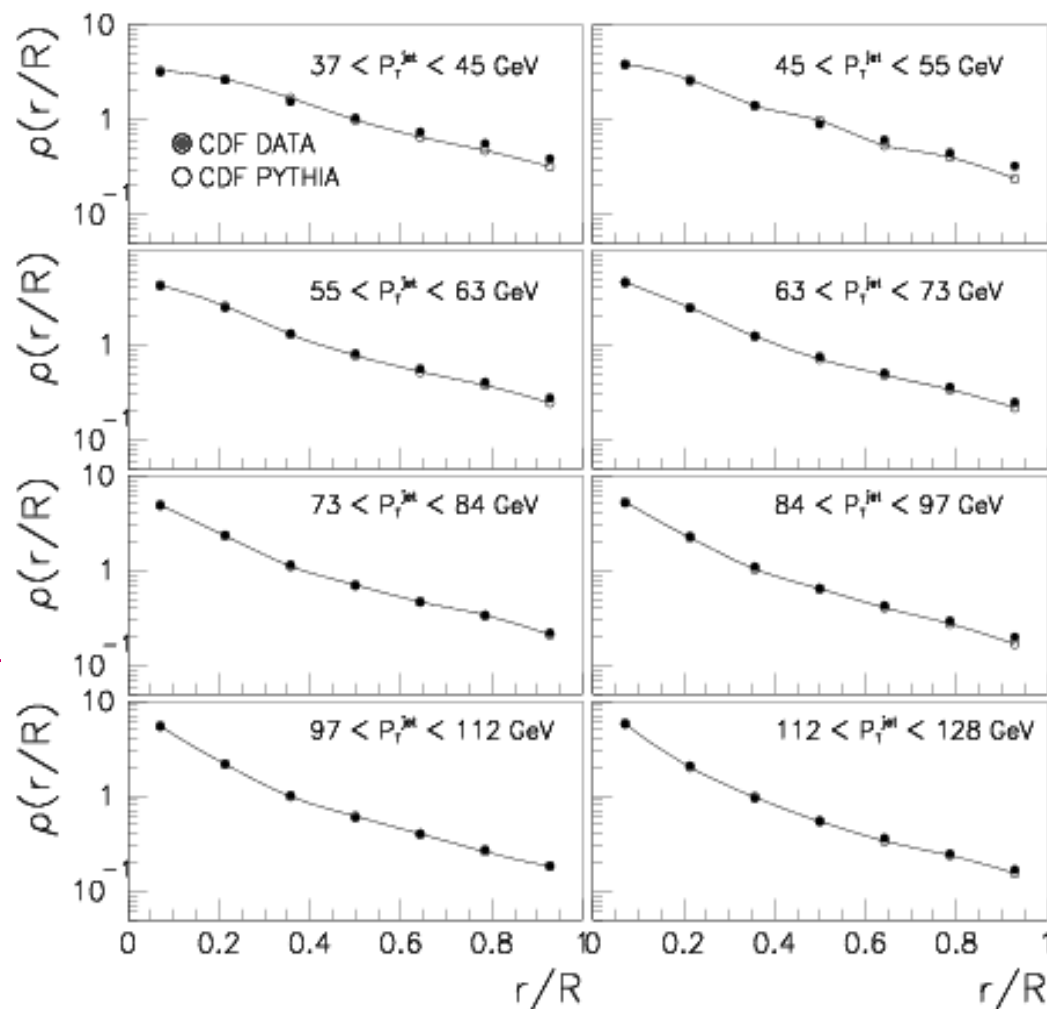


Jet Shapes using CAL (Ic)

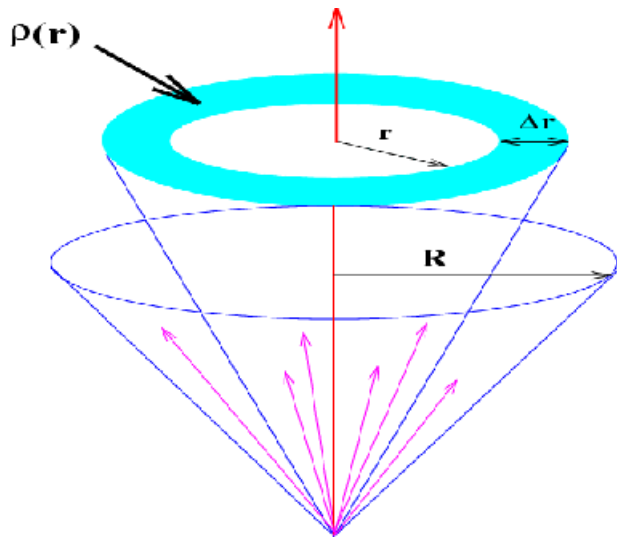


$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0, R)}$$

Jet Shapes using CAL (uncorr.)

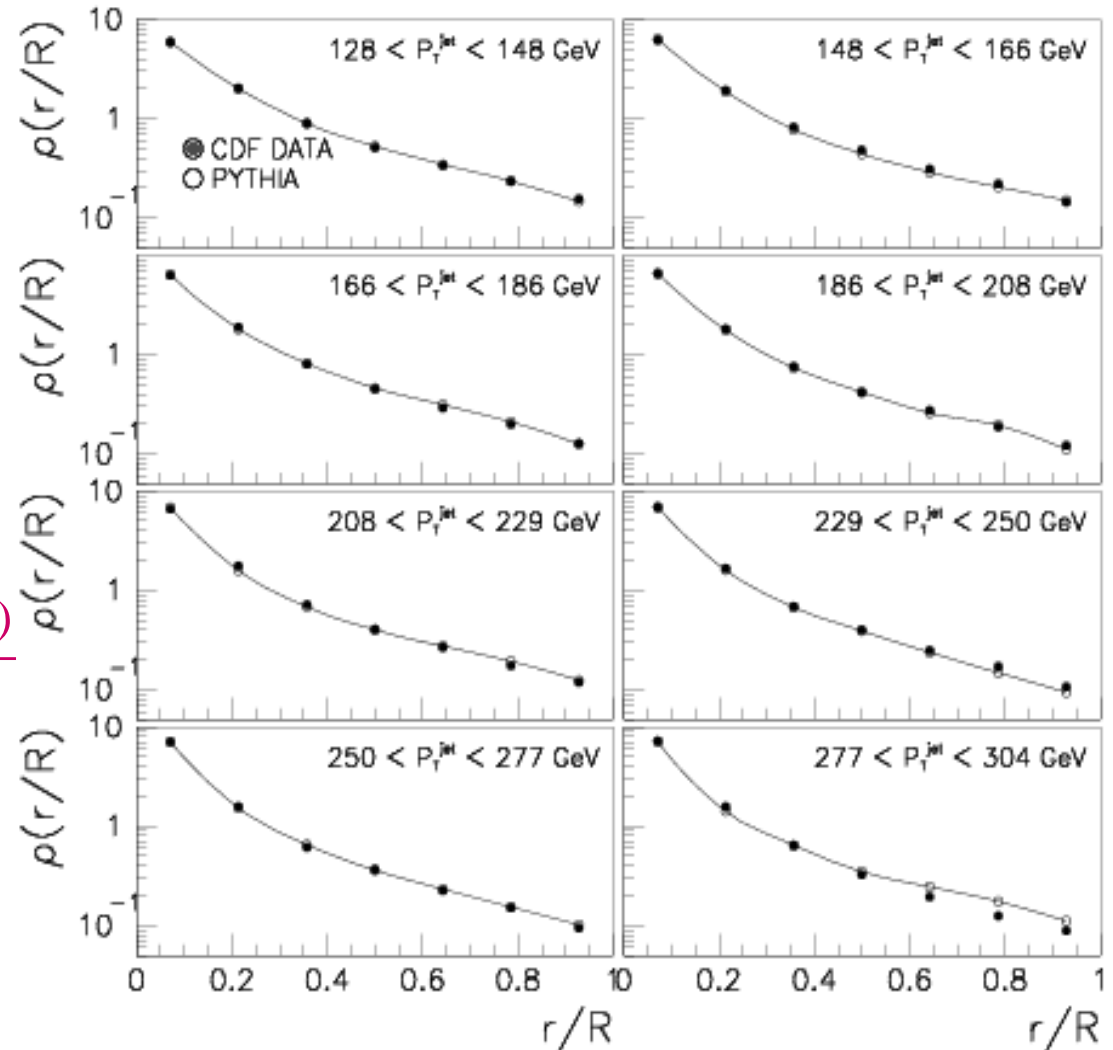


Jet Shapes using CAL (Id)



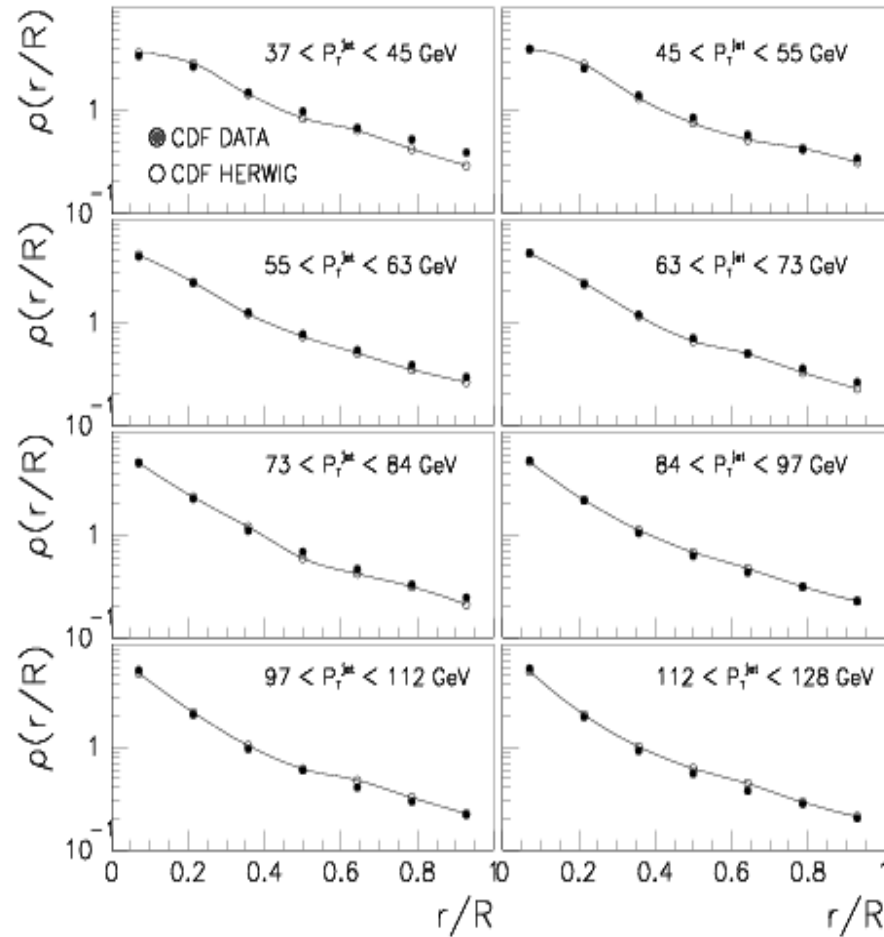
$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0, R)}$$

Jet Shapes using CAL (uncorr.)

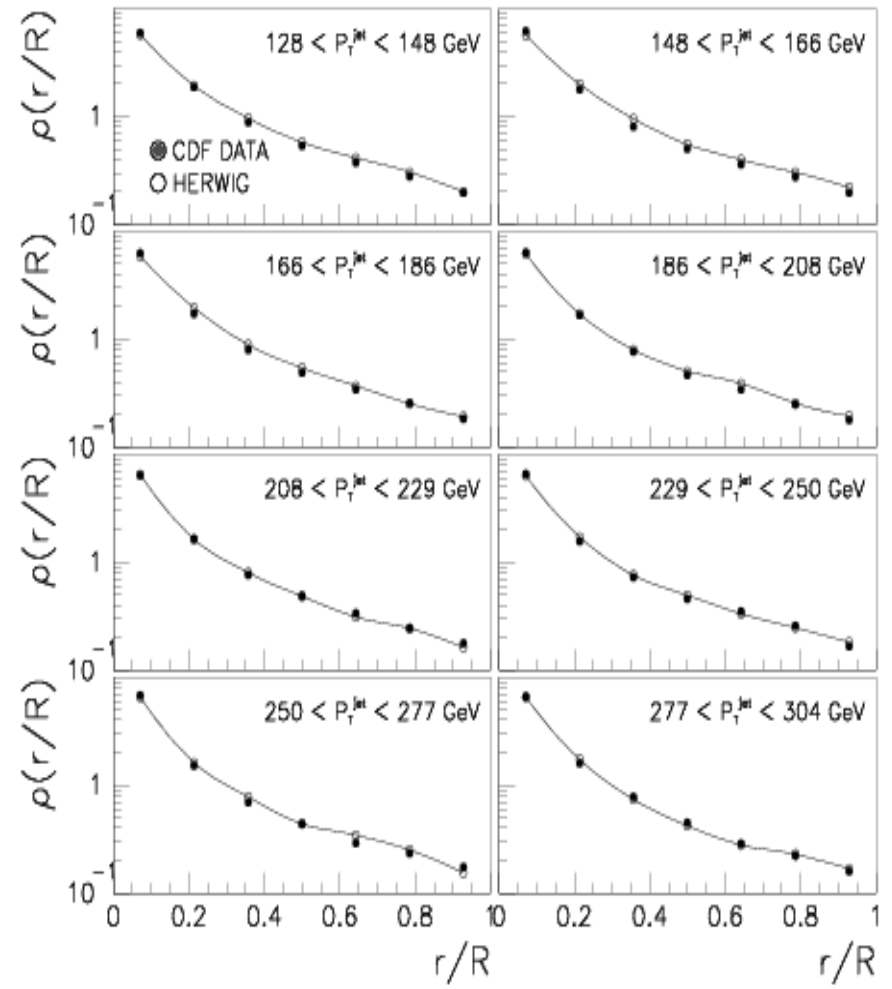


Jet Shapes vs Herwig (Ia)

Jet Shapes using COT (uncorr.)

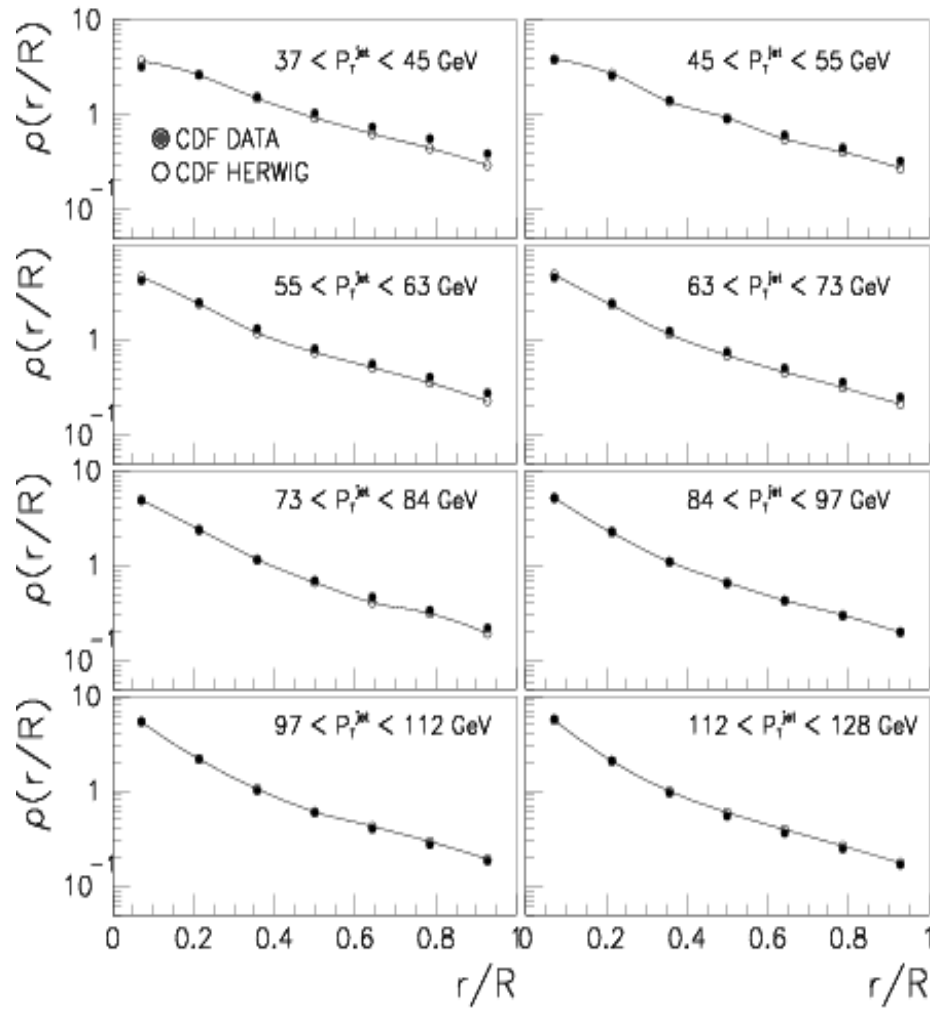


Jet Shapes using COT (uncorr.)

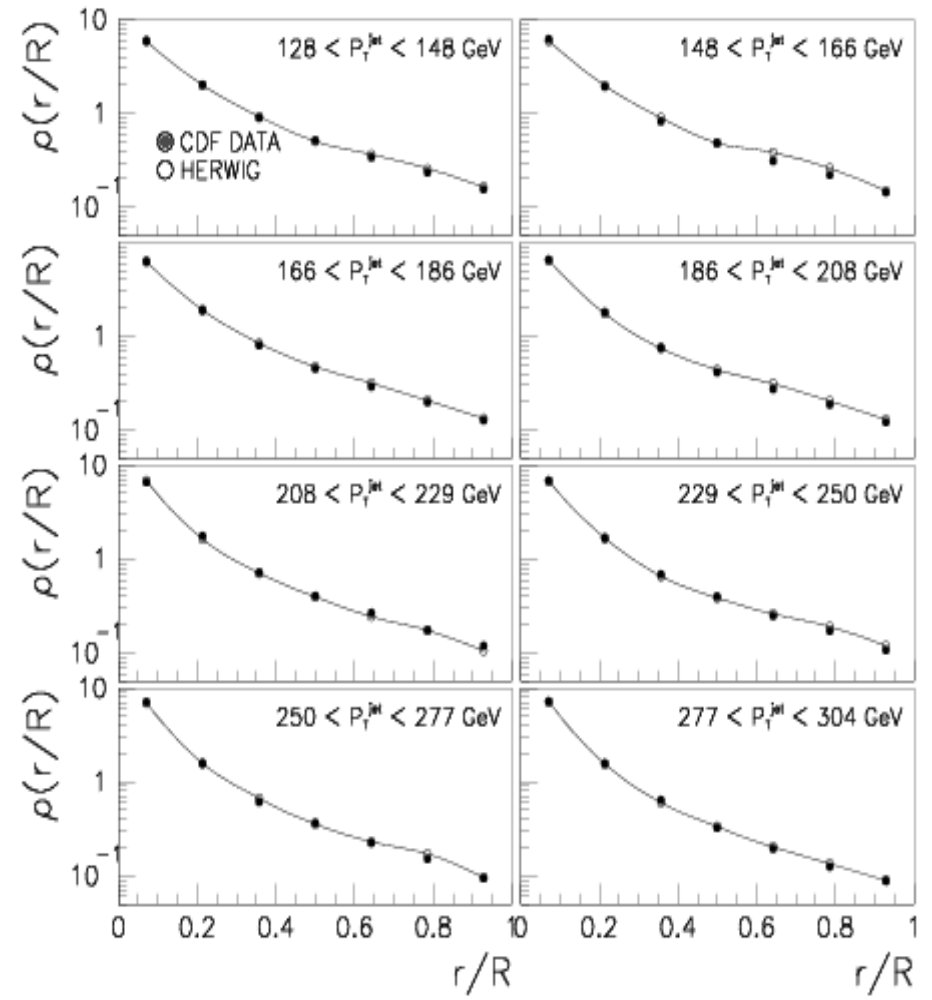


Jet Shapes vs Herwig (Ib)

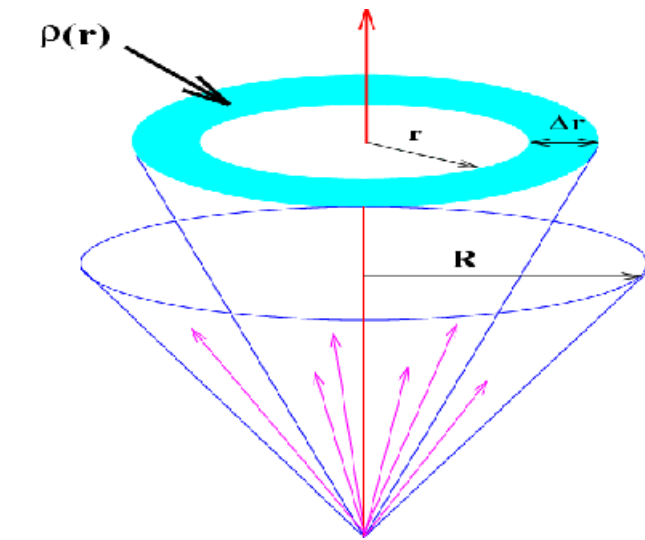
Jet Shapes using CAL (uncorr.)



Jet Shapes using CAL (uncorr.)

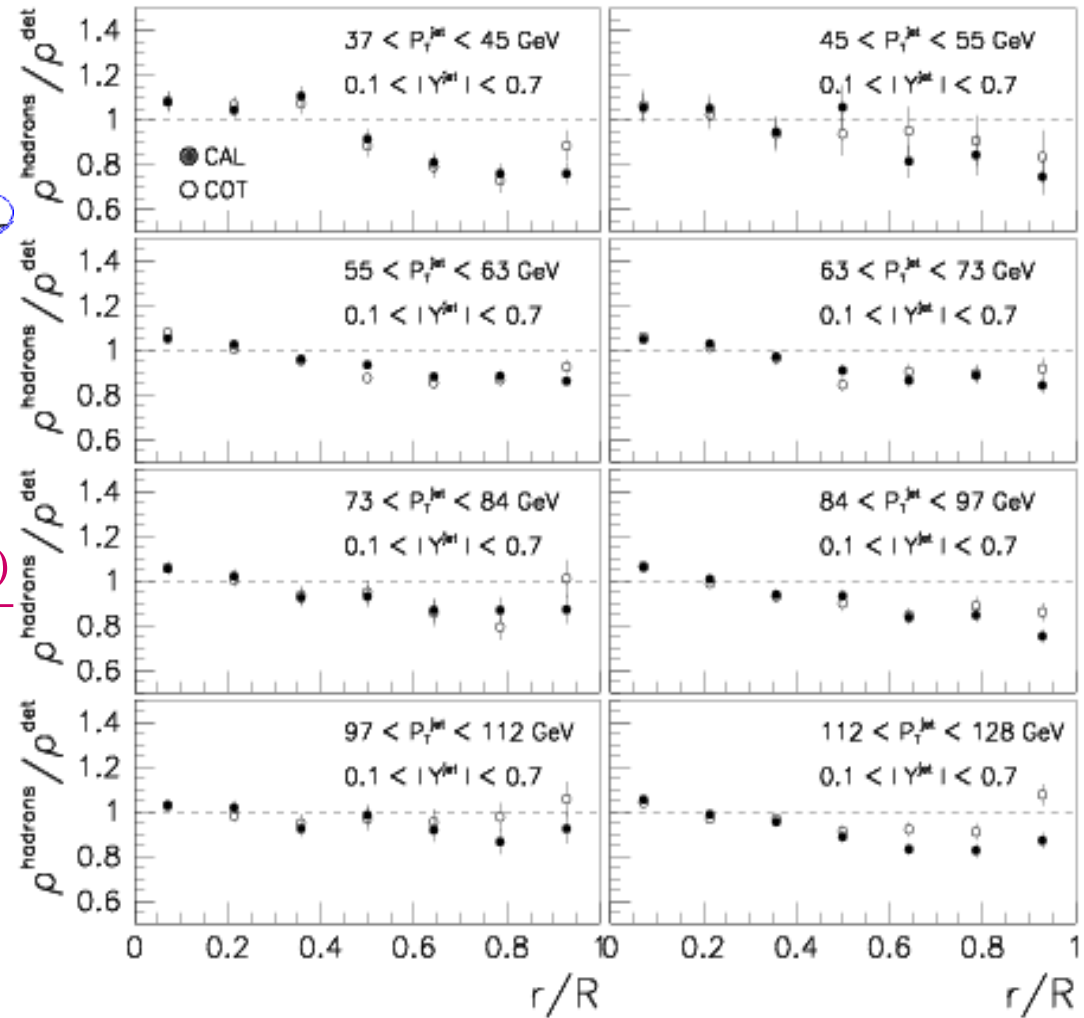


Jet Shapes Hadron vs Detector (I a)

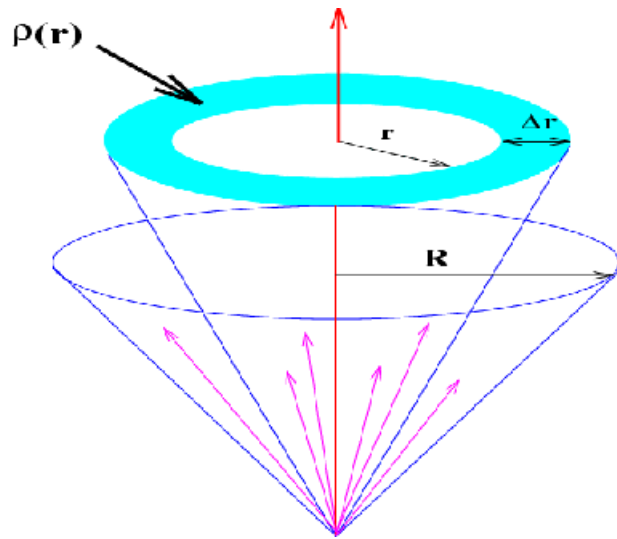


$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0, R)}$$

correction to hadron level (pythia)

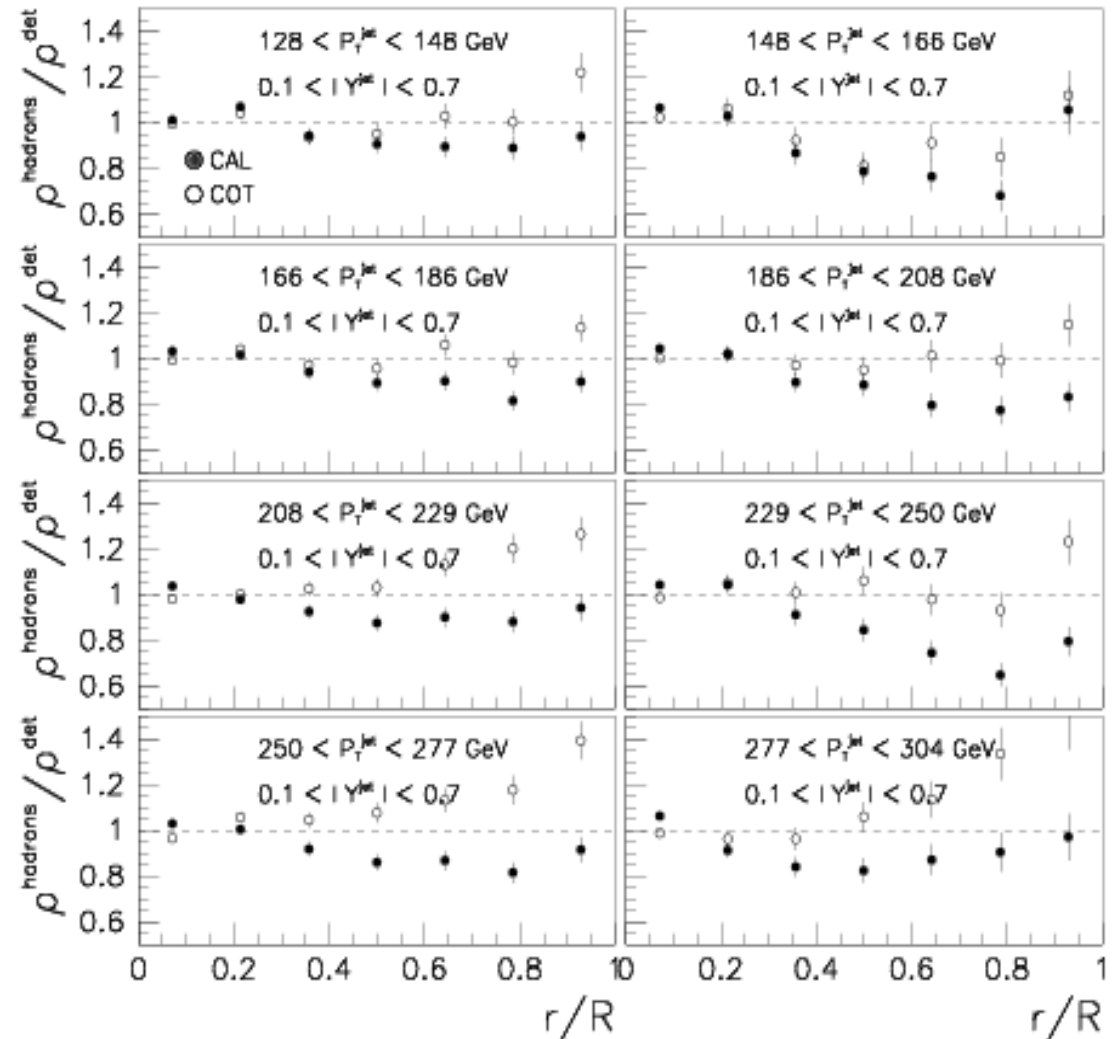


Jet Shapes Hadron vs Detector (I b)



$$\rho(r) = \frac{1}{\Delta r} \frac{1}{N_{jet}} \frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0, R)}$$

correction to hadron level (pythia)

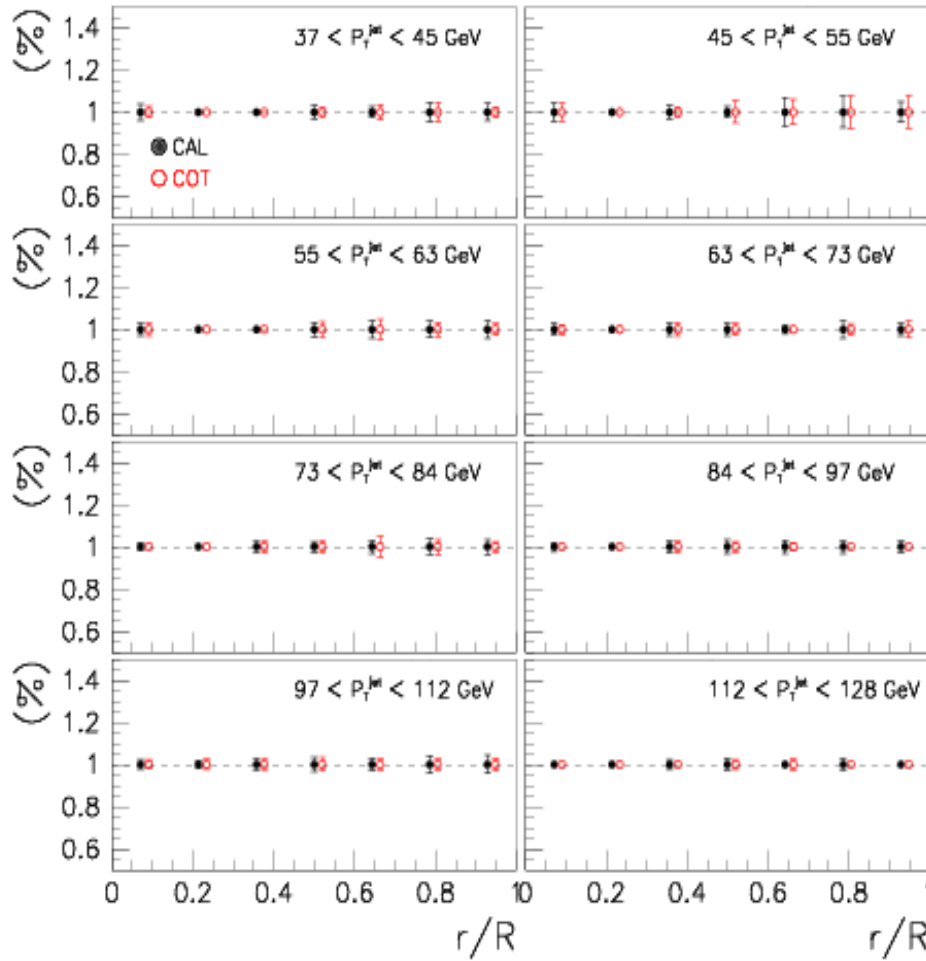


Systematic Uncertainties

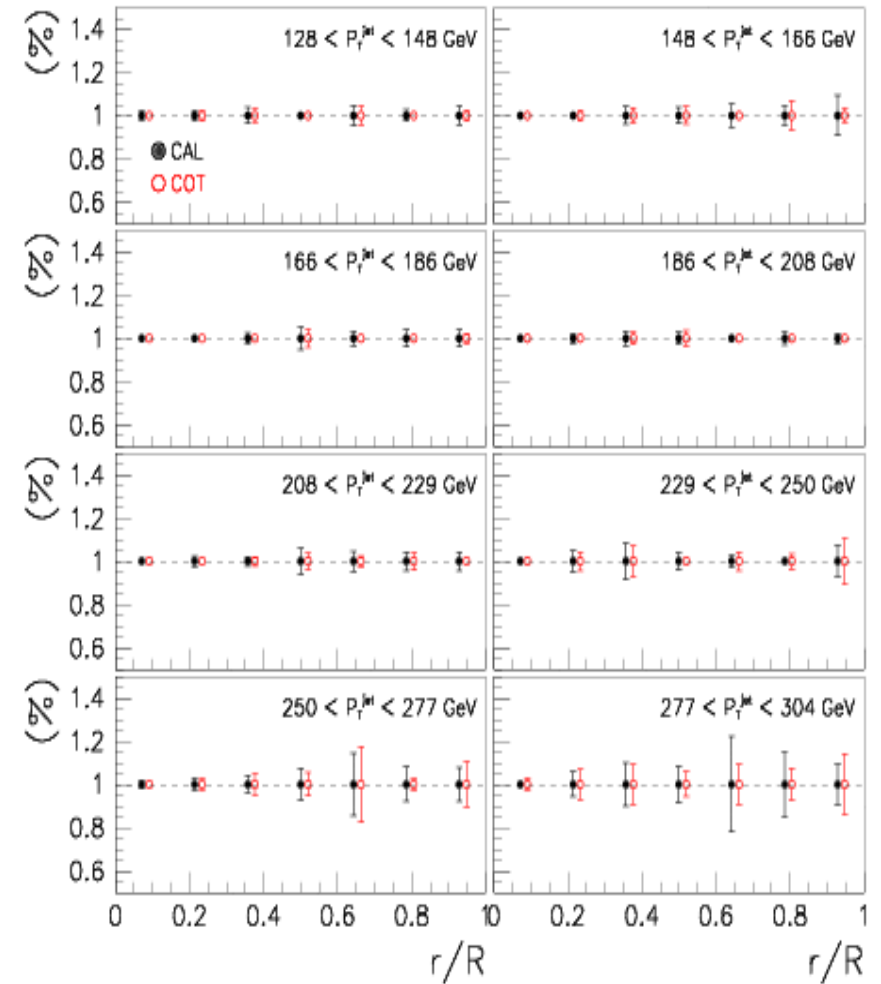
- Energy Scale of Jets ($\pm 5\%$)
- Unfolding using Herwig instead of Pythia
- Simulation (difference on COT/CAL in DATA and MCratio removes the physics...remains possible defects on simulation...
- Additional Checks
 - Independent with Inst. Luminosity
 - No affected by MidPoint reported bug

Systematic Uncertainties (Ia)

Energy Scale Uncertainty (5 %)

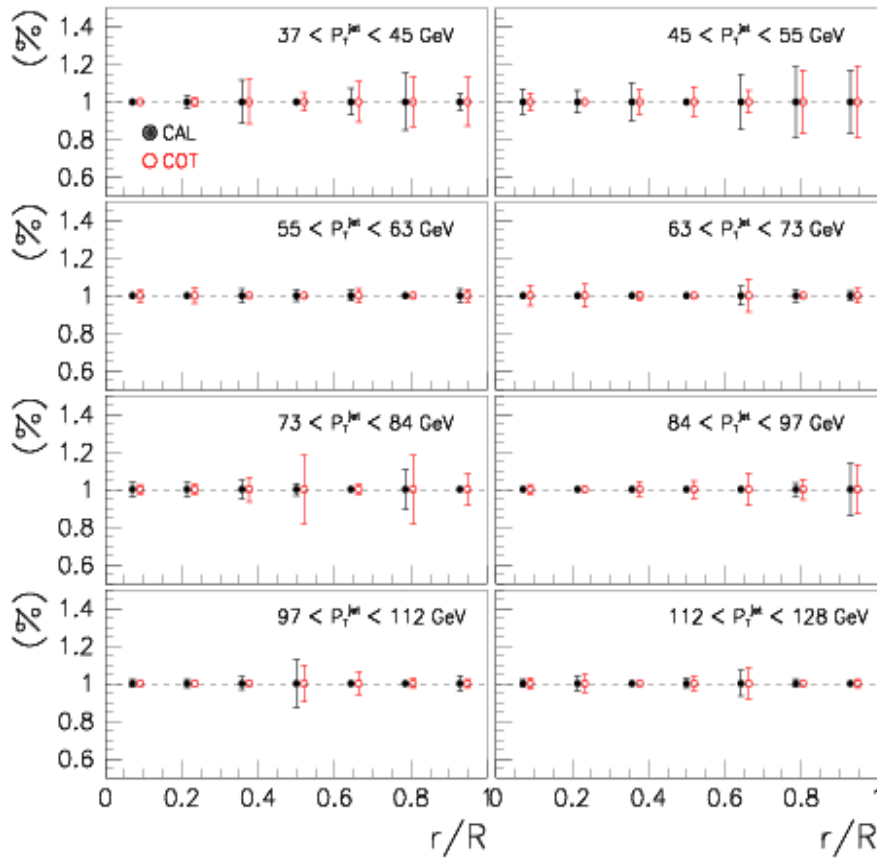


Energy Scale Uncertainty (5 %)

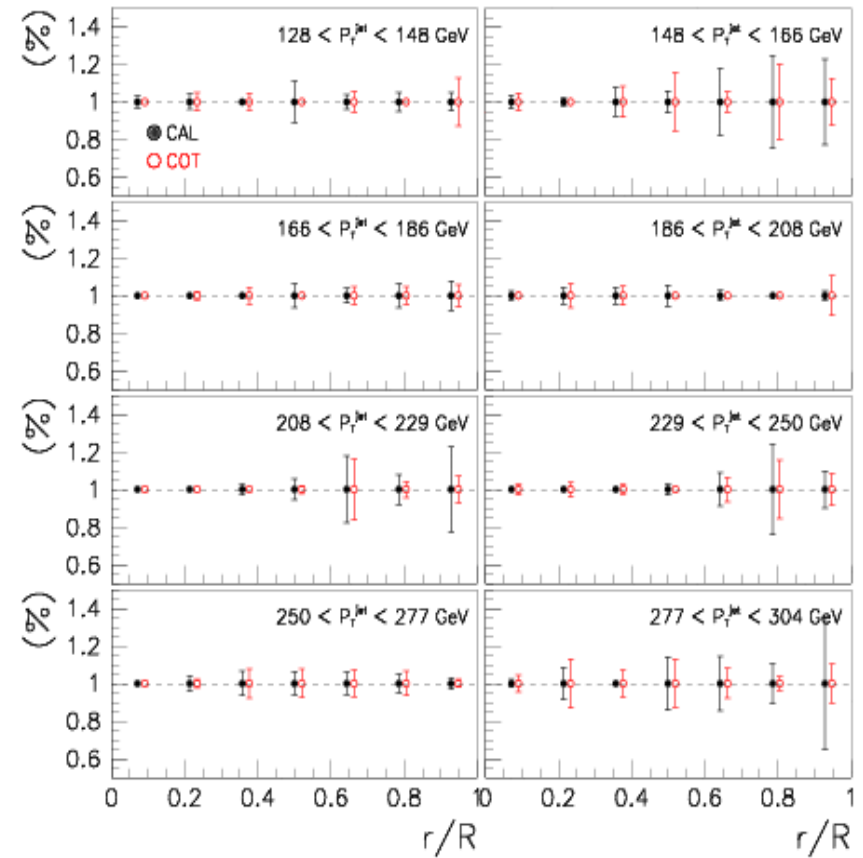


Systematic Uncertainties (Ib)

Uncertainty (HERWIG vs PYTHIA) Unfolding

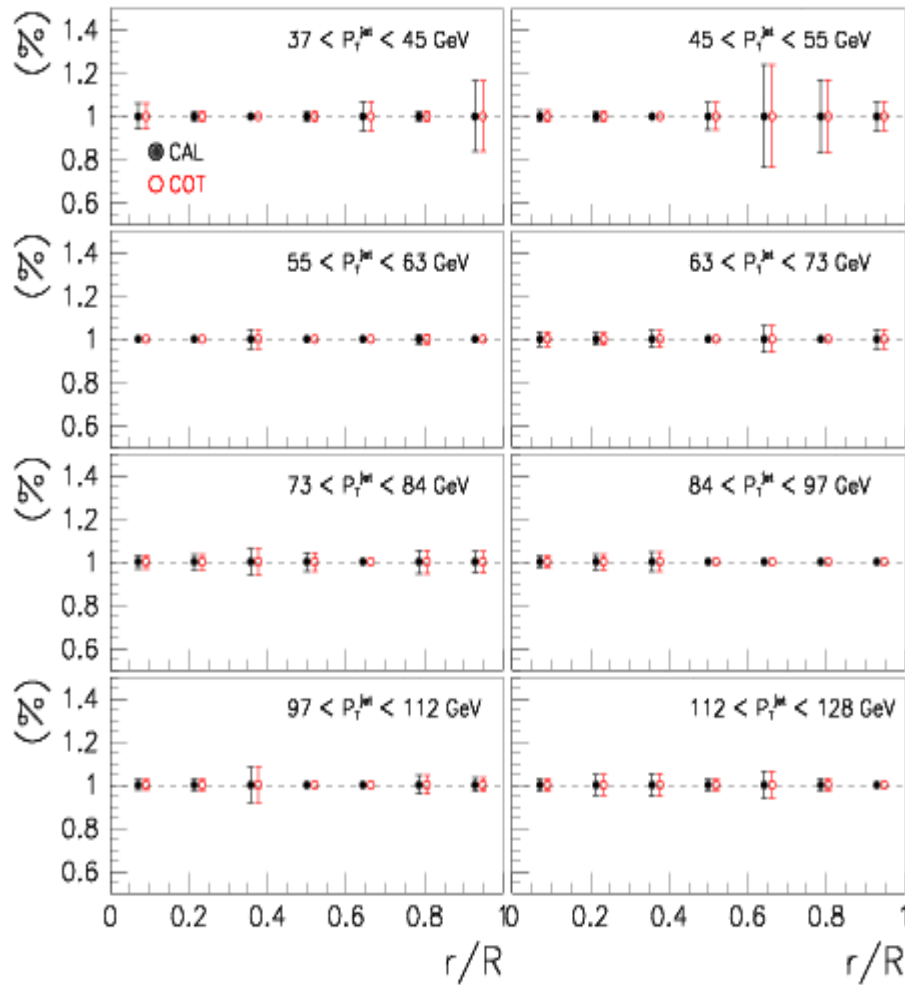


Uncertainty (HERWIG vs PYTHIA) Unfolding

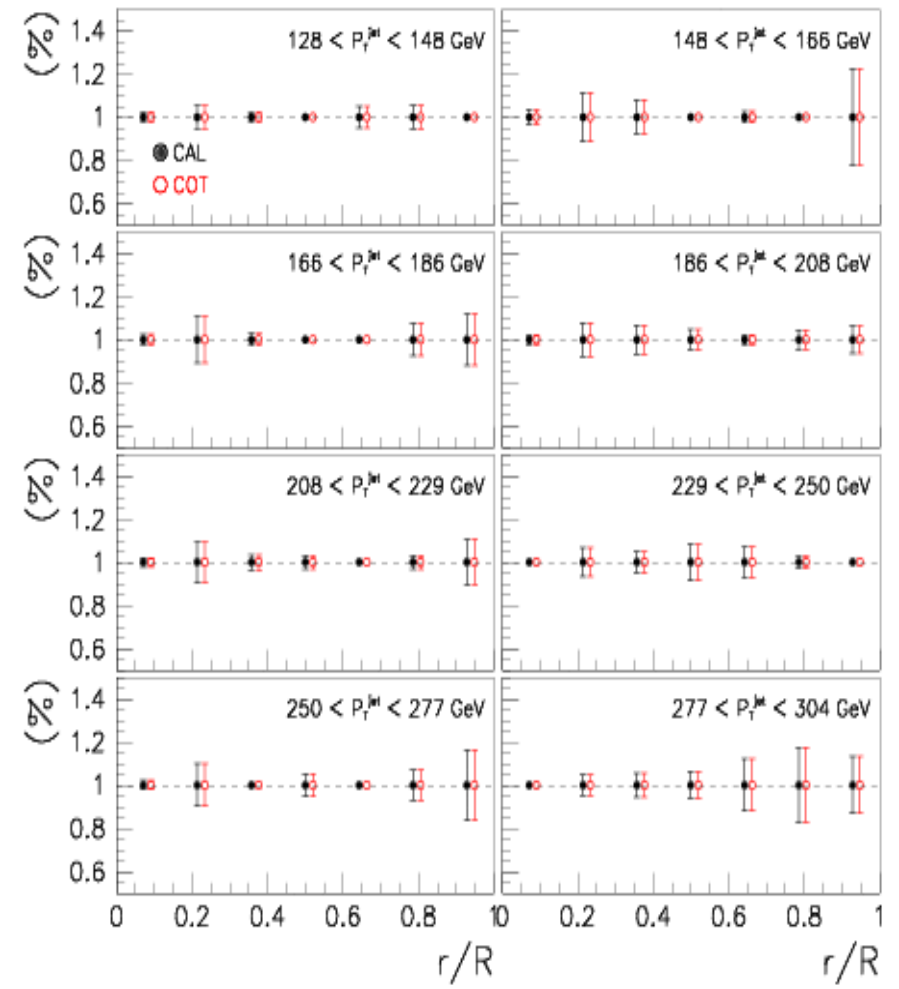


Systematic Uncertainties (Ic)

Uncertainty (Simulation)

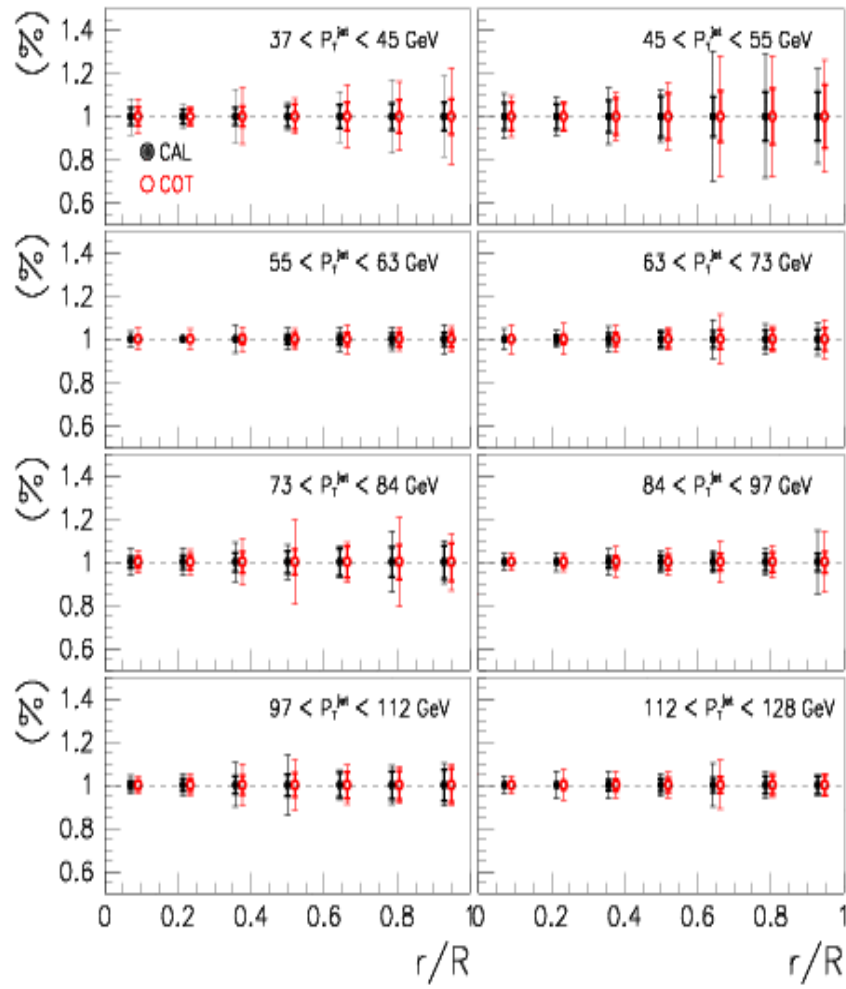


Uncertainty (Simulation)

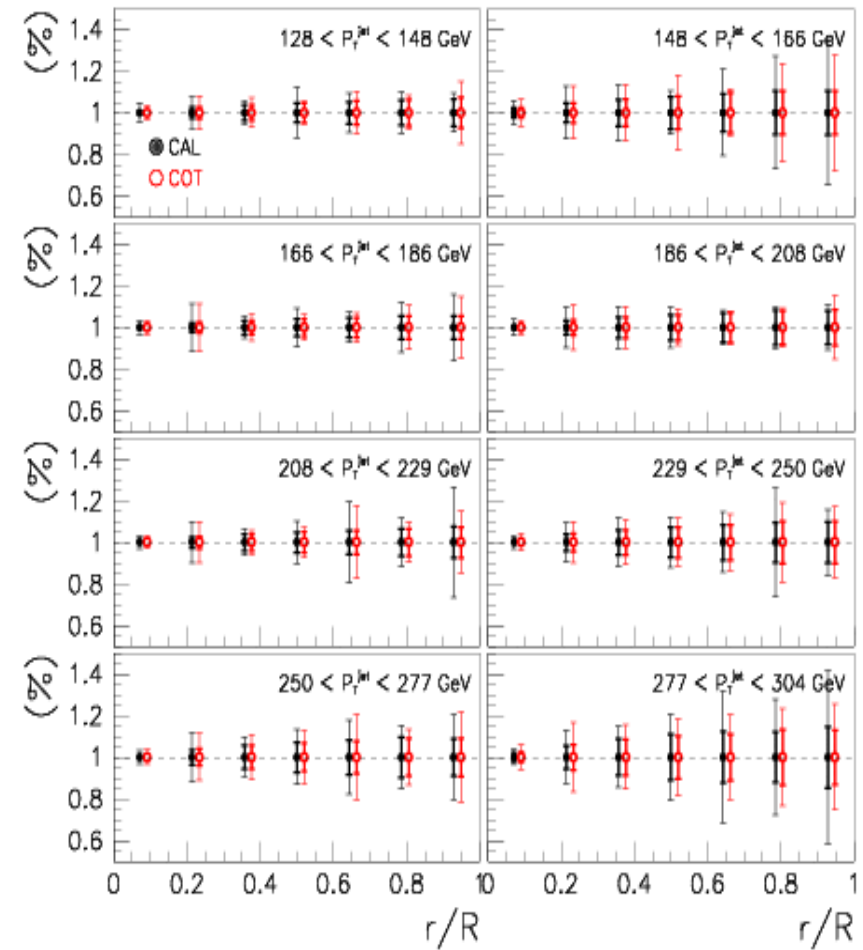


Total Uncertainties (I)

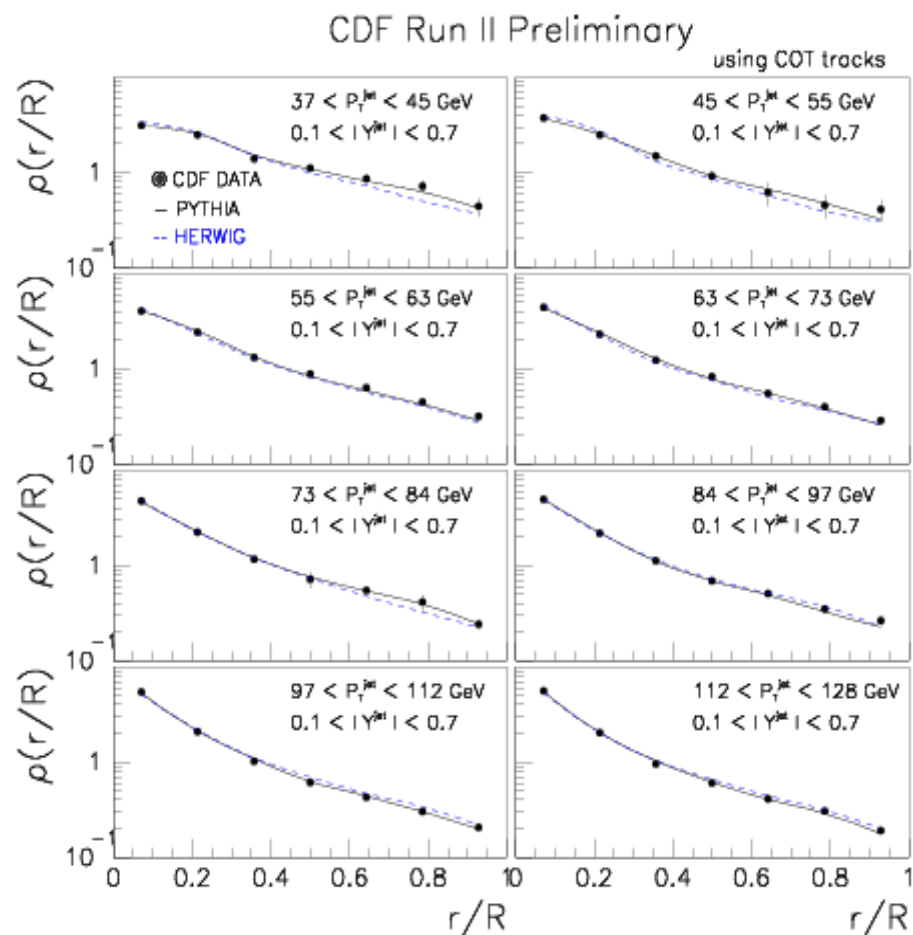
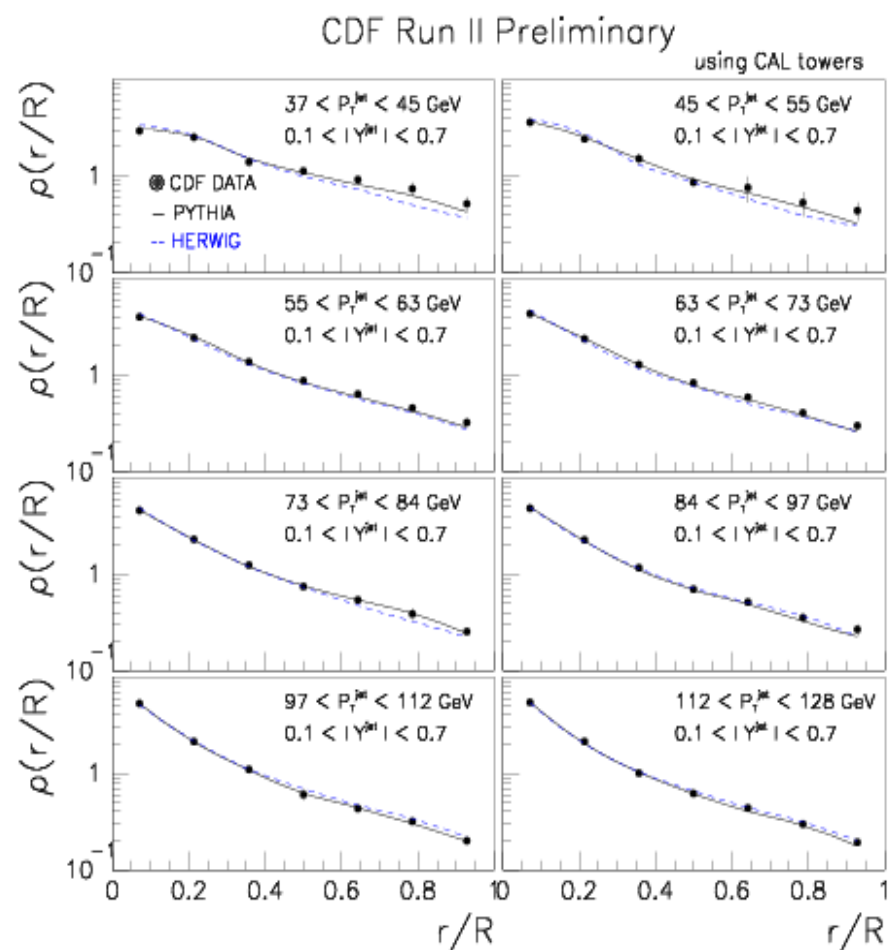
Uncertainties



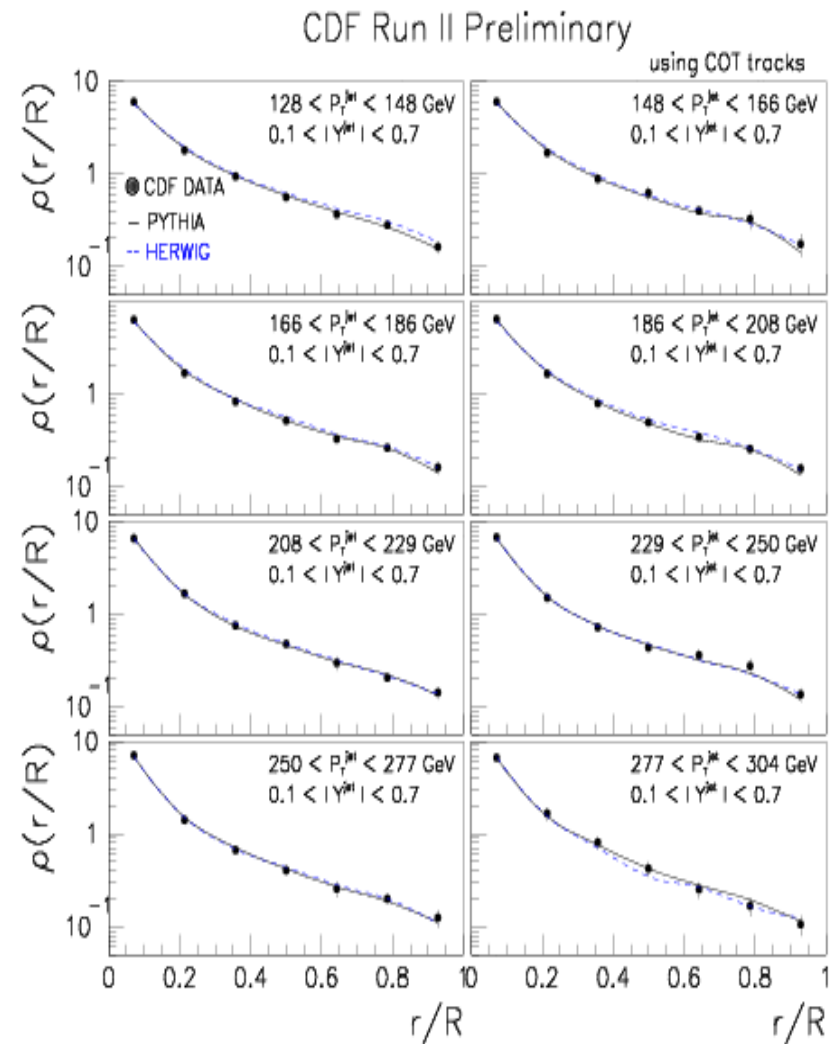
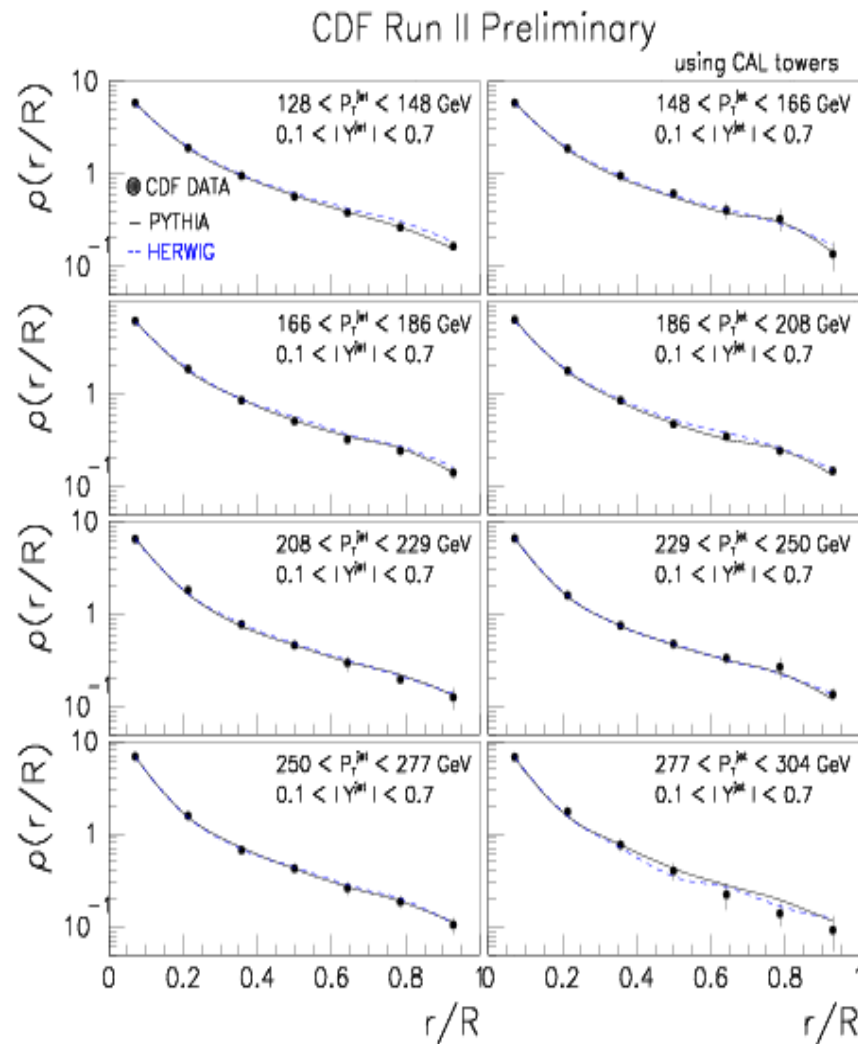
Uncertainties



Final Measurement (I)

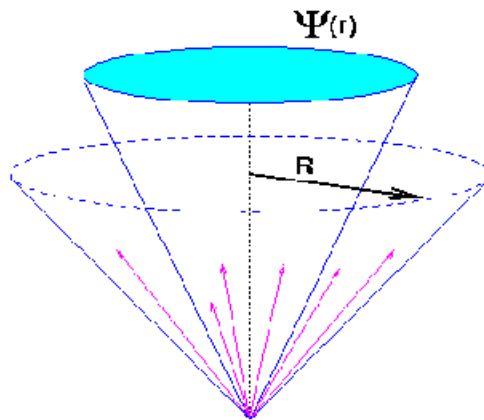


Final Measurement (Ib)



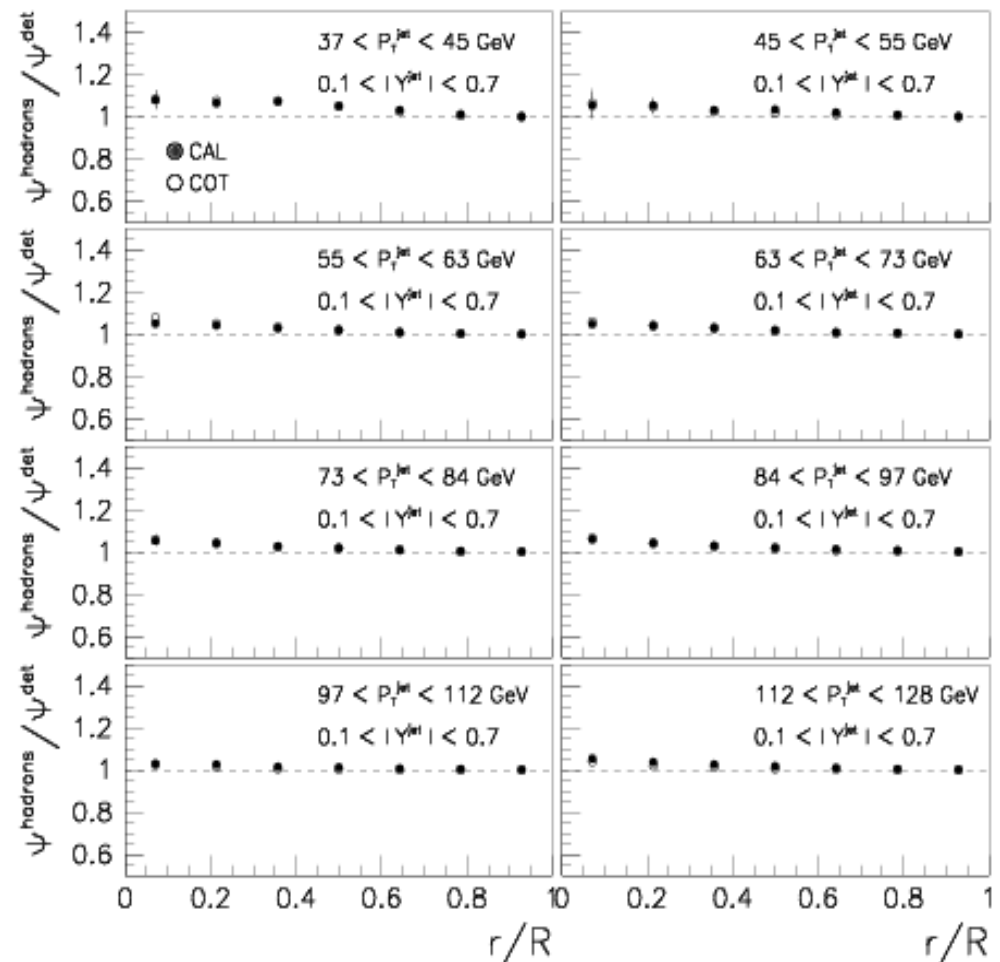
Integrated Jet Shape

Integrated Jet Shape Definition



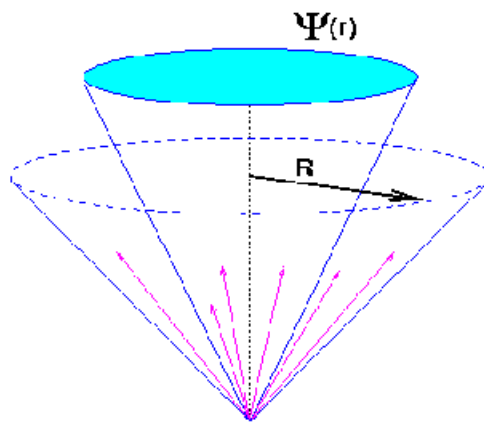
Same procedure as
in the differential case

correction to hadron level (pythia)



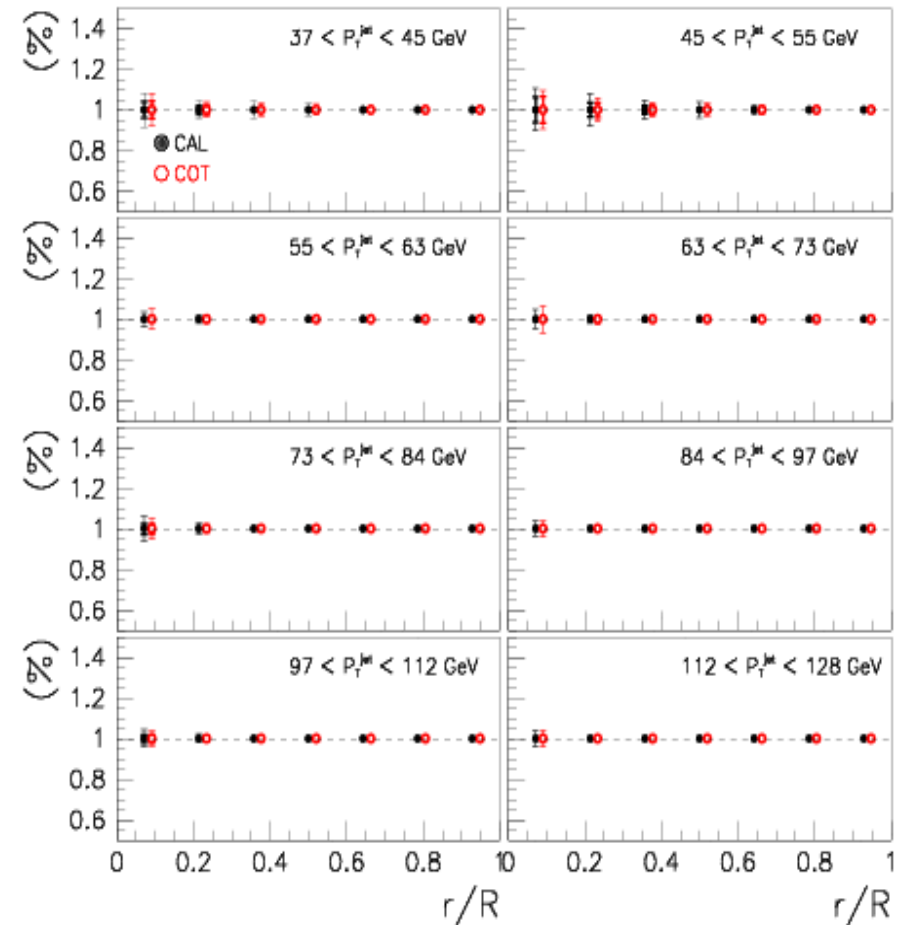
Integrated Jet Shape

Integrated Jet Shape Definition



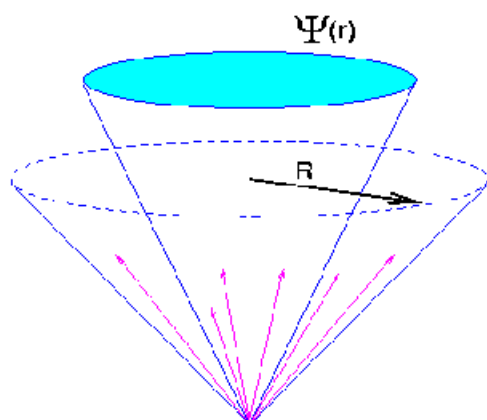
Same procedure as
in the differential case

Uncertainties



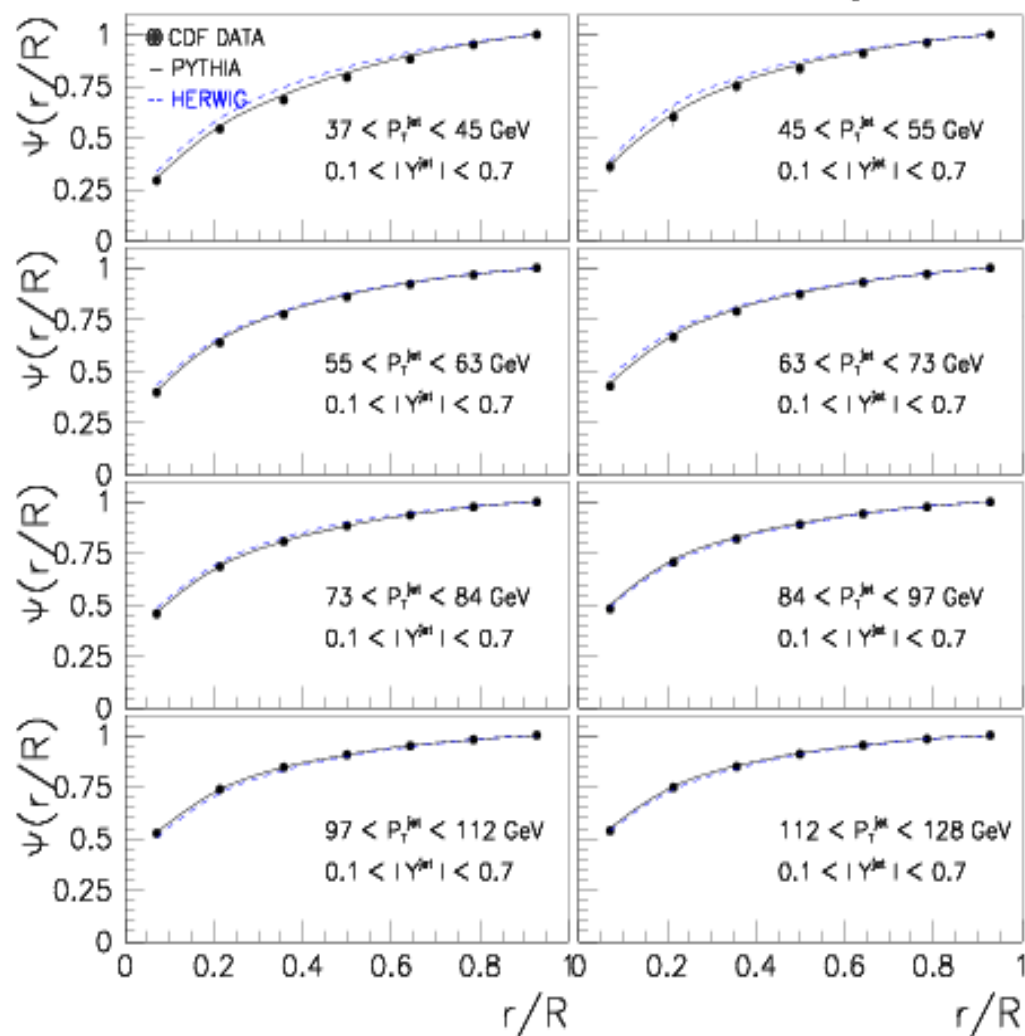
Integrated Jet Shape

Integrated Jet Shape Definition



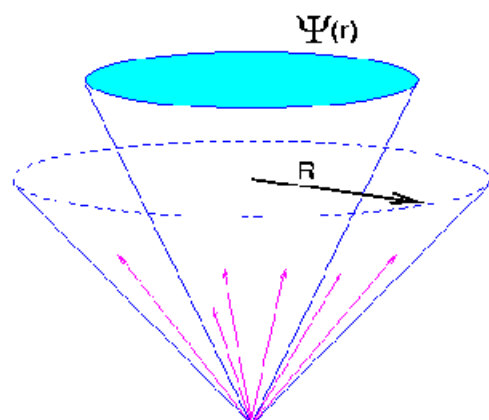
Same procedure as
in the differential case

CDF Run II Preliminary using CAL towers

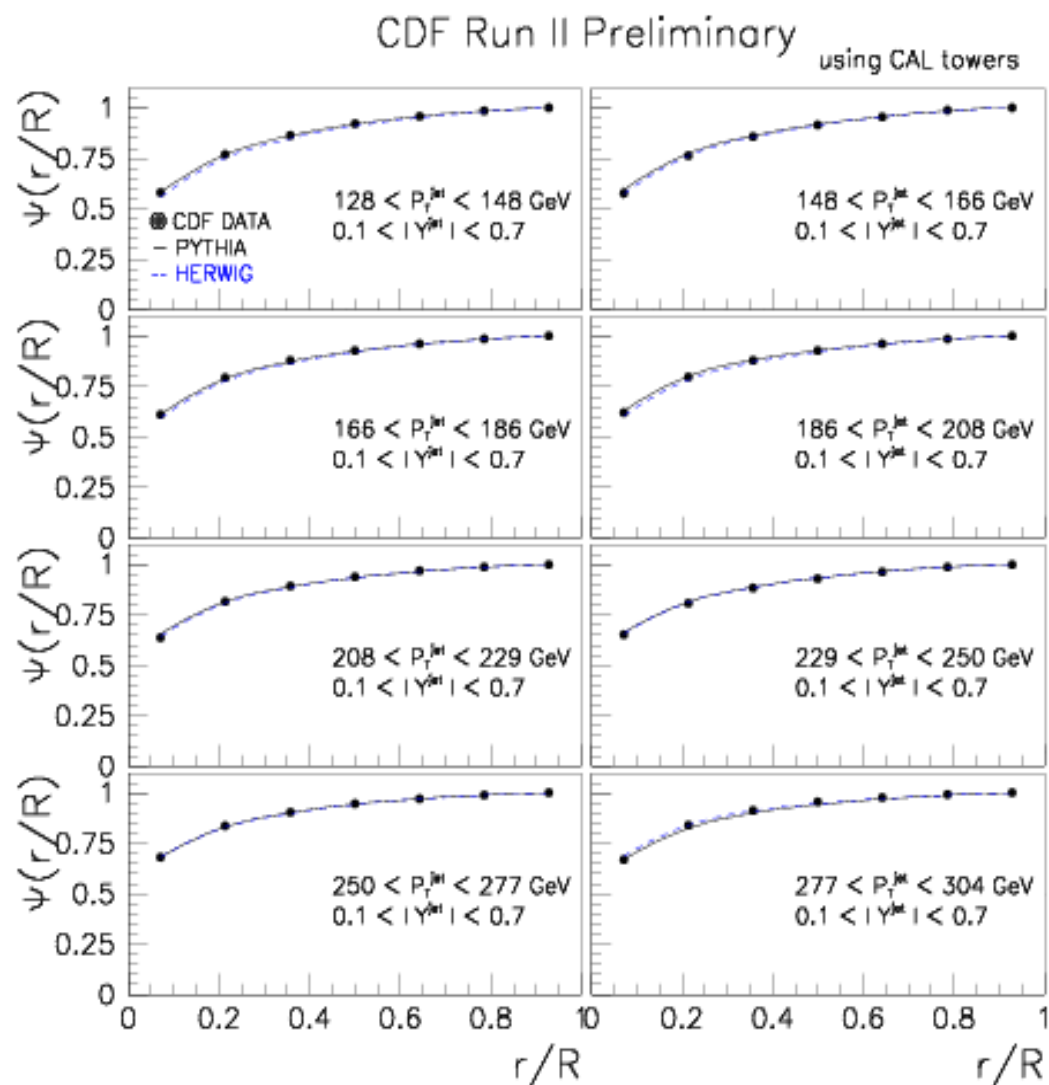


Integrated Jet Shape

Integrated Jet Shape Definition

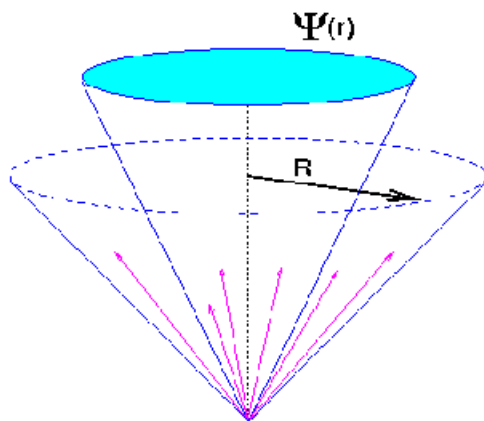


Same procedure as
in the differential case

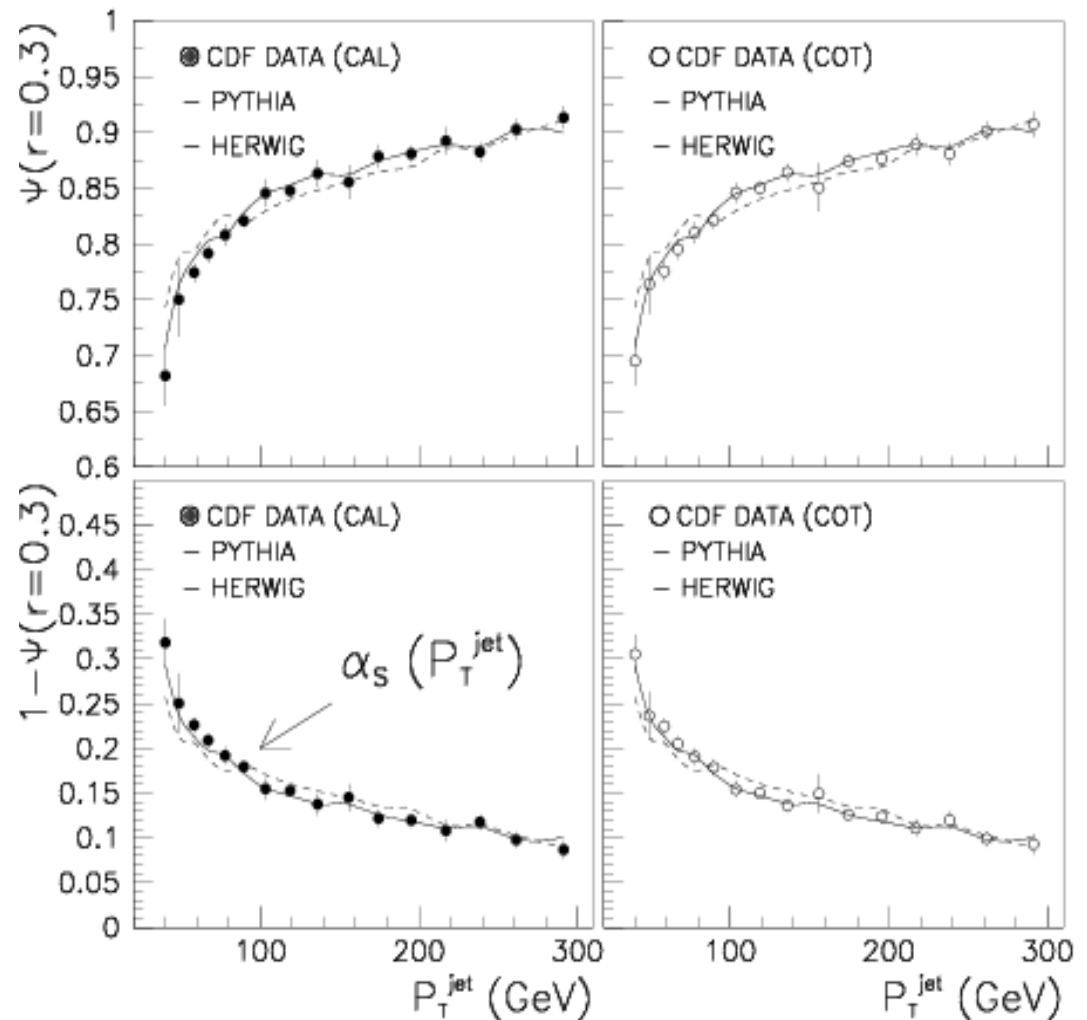


Evolution with transverse P_t

Integrated Jet Shape Definition



Comparison with NLO pQCD
would allow us to measure
the coupling (module R_sep)



Plans

- Ready for Preblessing in two weeks
 - Still a bit of work to reduce systematics due to MC
 - Possible extension to ~ 400 GeV jets
 - Use of latest jet corrections (extended to higher p_T)
- A complete CDF note on the way
- If possible comparison with NLO pQCD....
- Precise measurements very useful for future MC tuning...let's publish it now!
- Pythia Tune A makes a great job on jet shapes

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